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A STUDY ON SHRINKAGE DISTORTION
OF BUTT WELD

by

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A STUDY ON SHRINKAGE
DISTORTION OF BUTT WELD

by

Nguyễn-Tiên-Ich

//

S.B., Naval Academy of Brest (FRANCE); (1957)

B.A., Saigon University (VIET-NAM); (1962)

Submitted in partial fulfillment of the requirements
for the Degree of Master of Science and Naval Engineer
at the
Massachusetts Institute of Technology
June, 1969

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NGUYEN-T. BEN-ICH

A STUDY ON SHRINKAGE DISTORTION OF BUTT WELD

by

Nguyễn-tiên-Ich

Submitted to the Department of Naval Architecture and
Marine Engineering on May 23, 1969 in partial fulfillment
of the requirement for the degree of
Master of Science and Naval Engineer

ABSTRACT

In a welded structure, shrinkage and external constraint are closely related. Shrinkage decreases as Degree of Constraint increases.

In the first part, this paper presents:

- (1) a formula that can be used to find the transverse shrinkage of a free joint in the case of a butt weld,
- (2) the definition of the degree of constraint of restrained structures,
- (3) the empirical correlation between transverse shrinkage and degree of constraint.

In the second part, this paper presents:

- (1) analytical formulae for the degree of constraint of some simple joint configurations,
- (2) the numerical method for the degree of constraint of other joint configurations and the tabulation of the results obtained.

In the last part, the use of the degree of constraint to determine the cracking susceptibility of a welded structure is suggested and a method of experimentation to verify the numerical results obtained in the second part is proposed.

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SUMMARY

Distortions and residual stresses unavoidably accompany every welded structure. They are not independent of each other. In the case of an unrestrained structure, the shrinkage distortion is determined by the welding heat and can be determined. However, practical structures are seldom completely free and welding is performed more or less under external constraint, therefore it seems that if factors relating to welding heat are definite, the ratio of shrinkage distortion under external constraint to the one in a free welded joint is uniquely decided by the degree of external constraint to which weldments are subjected, or:

$$(\text{shrinkage under external constraint, } S_t) = (\text{shrinkage in free welded joint, } S_{tf}) \times F_c$$

where F_c is a function depending on the degree of constraint. S_{tf} is the transverse shrinkage of the unrestricted joint or free joint. For a butt joint, S_{tf} has the following expression:

$$S_{tf} = C_1 \frac{A}{h^2} \log_e \frac{W}{W_0} + C_2 \left(\frac{A}{h^2}\right)^{1/2}$$

where:

A = sectional area of the groove of the butt joint,

h = plate thickness,

W = weight of deposited metal per unit weld length,

W_o = weight of deposited metal per unit weld length per welding of each pass, and

C_1 and C_2 are coefficients depending on arc voltage, arc current, arc efficiency, filler metal diameter, and melted weight of rod per unit current and unit time.

For example with the Ilumenite type filler rod of 3.2 mm diameter, with weld current of 120A and welding speed of 0.3 cm/s, it has been found that in the C.S.G. unit system:

$$C_1 = 0.0960, \quad C_2 = 0.0416$$

In this order of idea, Masubuchi has defined the degree of constraint as:

$$\text{Degree of Constraint, } K = \frac{\text{Uniform transverse stress, } \sigma_{y_o}}{\text{Average Transverse Displacement } [\bar{v}]_\ell} \quad (1)$$

where $[\bar{v}]_\ell$ is the average of the transverse displacement taken along the weld length ℓ , and has found a graphical correlation between transverse shrinkage and degree of constraint K (references 1,2).

Later, Watanabe and Satoh, after analyzing the experimental results obtained by Masubuchi and others, have found a correlation of the form:

$$\frac{S_t}{S_{tf}} = \frac{1}{1 + 0.086K^{0.87}} \quad (2)$$

therefore, in order to determine the shrinkage distortion, the value of K must be known.

On the other hand external constraint promotes stress. In fact, the level of stress can be found by combining (1) and (2):

$$\sigma_{y_0} = K[\bar{v}]_{\ell}$$

and for a butt weld, $S_t \approx [\bar{v}]_{\ell}$ for an actual weld. Therefore:

$$\overline{\sigma_{y_0}} = S_{tf} \frac{K}{1+0.086K^{0.87}} \quad \overline{\sigma_{y_0}} \text{ is the average reaction stress along the weld due to constraint}$$

If the external constraint is too high, residual stress can reach a dangerous level where cracking can occur. Here again, it is essential to know K .

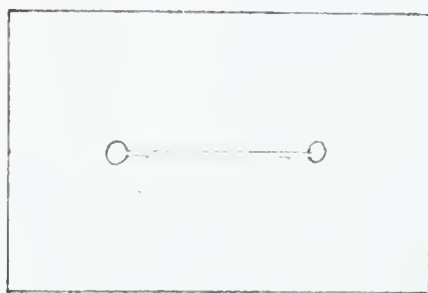
In a few cases, K can be found analytically. But in most practical cases, it has to be computed numerically.

The object of this study is to compute numerically the values of K for some test specimens and to propose a method of experimentation to verify the computed results. Also the degree of constraint in the case of patch weld has been determined analytically.

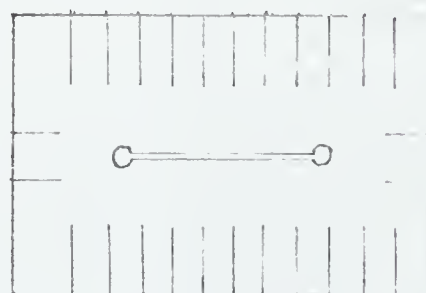
The numerical method used is the finite element method in which the plate structure is divided into small elements in each of which static equilibrium and geometrical compatibility have to be satisfied. In this case, for each specimen the values of K are computed as a function of $R = \frac{\ell}{L}$ where ℓ is the weld length (in this case, it is the length upon which the uniform stress σ_{y_0} acts) and L is the length of the slit. The results are presented as the non-dimensionalized degree of constraint $\bar{K} = \frac{K}{(E/L)}$ (E is the modulus of elasticity) curves versus $R = \ell/L$ in the attached

4
diagram (Figure 9).

One exception is made in the case of the Lehigh test specimen where the weld is made all along the length of the slit



without saw cut



with saw cut

($l=L$, $R=1.0$). In these cases, experimental data are available for comparison:

	K_{computed}^*	K_{measured}	$\% \frac{K_{\text{computed}} - K_{\text{measured}}}{K_{\text{computed}}}$
No Sawcut	45.3 Kg/mm ² -mm	44 Kg/mm ² -mm	2.87
With Sawcut	28.9 Kg/mm ² -mm	27 Kg/mm ² -mm	6.70

* Assuming $E = 19.9 \times 10^3 \text{ Kg/mm}^2$

The object of the Lehigh test specimen is to find the critical value of K or range of values of the degree of constraint above which weld cracking may develop, below which it may not. The analytical results obtained in the case of a patch weld, which consists of a circular disc welded to a plate, are for the case of a plate with large dimensions (infinite plate):



Patch Weld

- (1) If the weld can be made along the whole circle in one pass, then:

$$K = \frac{\sigma_R}{u_R} = \frac{1}{2} \frac{E}{R}$$

R is the radius of the plate,

σ_R is the radial stress of the perimeter of the disc, and

u_R is the radial displacement at the weld.

- (2) If the weld can be made within a sector 2α , then:



$$K = \frac{\sigma_R}{[\bar{u}_R]_{2\alpha}} = \frac{\Pi E}{2\alpha R} \times \frac{1}{2-f(2\alpha)}$$

where $[\bar{u}_R]_{2\alpha}$ is the average radial displacement over the welded sector 2α and $f(2\alpha)$ is a series function of 2α with $f(0)=f(\Pi)=0$ and

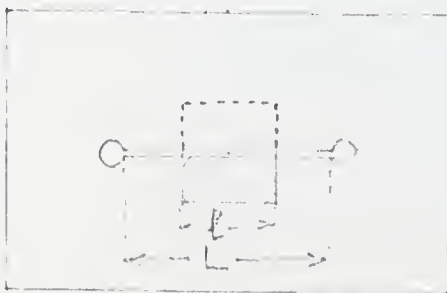
the series converges as $\frac{1}{n^2}$.

Because of the linearity of the relations in elastic deformation, the displacement is inversely proportional to the modulus of elasticity E , and K , which is defined as a stress divided by the corresponding average displacement, is proportional to E . Therefore a new factor, called specific degree of constraint K' , and defined as:

$$K' = \frac{K}{E}$$

is independent of the linear elastic material and dependent only on the geometry of the weld.

Therefore experiments to determine the values of K to verify the computed results can be conducted on any linear elastic materials, preferably the ones that have small E and are not expensive. Plastic materials are proposed, and a mechanical way to stress the specimens is to drive two wedges to make an assembly



wedge shape

with parallel faces into the slit. Each specimen will have several sets of wedges with different widths ℓ so that K' can be found as function of $R = \frac{\ell}{L}$. Strain gauges put near the edges of

the slit and visible marks made at the immediate vicinity of the edges for optical measurements by microscope or comparator are used to determine stresses and displacements. In these experiments the material at the loading zone is in compression instead of tension as in the welding. It is of no consequence as far as the material is linear elastic in compression. It is actually, and the value of E is between 3 to 5 x 10⁵ psi (in compression).

The problem of shrinkage control could be conceived as a problem of choice between two alternatives, based on the degree of constraint K :

$$K = \frac{\sigma_{Y_0}}{[\bar{v}]_\ell}$$

and the Watanabe-Satoh relation:

$$\frac{[\bar{v}]_\ell}{S_{tf}} \approx \frac{S_t}{S_{tf}} = \frac{1}{1+0.086 K^{0.87}}$$

S_{tf} is the transverse shrinkage of a free joint and for a butt weld, $S_t \approx [v]_\ell$ at the weld. These alternatives are either to limit the shrinkage by increasing the external constraint, and thus accept a higher value of K and hence a higher level of residual stress or to reduce the residual stress level by relaxing the external constraint thus reducing the value of K and to accept a larger value of shrinkage distortion.

In the problem of cracking control, it is essential that the external constraint will result in a value of K below the range of critical degree of constraint K_c , characteristic of each material and each weld type.

In these two problems, the important factor is the degree of constraint K .



1

2

3

4



5

6

7

8



INTRODUCTION

I. General

Welding is an efficient method of fabricating structure. Various products ranging from miniature electronic components to bridges, ship hulls, rocket motor cases have been made by welding.

One of the troublesome problems that accompany the construction of welded structures is shrinkage distortion. The more complex the structure is, the more involved the problem becomes. Shrinkage distortion can cause mismatch of joints which leads to the possibility of welding defects.

The correction of weld distortion is costly and in some cases impossible. It is therefore desirable to develop some techniques to predict somehow the approximate values of the shrinkage distortion in order that palliative measures can be devised that will neutralize or reduce the effect of shrinkage distortion.

Another problem associated with welding is cracking. Cracks may form as a result of the welding operation and can occur within the weld metal or the base metal in the heat-affected zone.

There are two types of cracking that are experienced in



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welding: hot cracking and cold cracking. Hot cracking is believed to take place during the solidification of the weldment and can occur in the weld metal or in the heat affected zone. Hot cracks are of intergranular type. Cold cracking occurs at much lower temperatures than does hot cracking, in steels at temperatures below the start of the austenite-martensite transformation. Cold cracks may be formed during or after the welding operation; cold cracks are of transgranular type. Cracking, hot or cold, depends on many factors such as chemical composition of the base and filler metals, mechanical restraints, welding condition (heat, input). For given welding conditions, chemical compositions of the base and filler metals, it is desirable to develop a way of determining quantitatively the degree of restraint that may promote cracking.

II. Technical Background

Distortion in a welded structure may be determined as a function of structural parameters, material parameters and fabrication parameters.

The structural parameters include the geometry of the structure, the shape of the joining boundary and the type of the joint.

The material parameters are the nature of the base and filler materials.

The fabrication parameters include the welding process, the heating procedure, the welding sequence, the degree of

constraint.

The degree of constraint, which will be the principal object of this study, is a parameter which characterizes the external mechanical constraint to which a weld is subjected. For example, the degree of constraint of a weld made throughout along the median line of a rectangular plate, case (a),



(a)



(b)

is different from that of a weld made only partially along this line, case (b). In fact, in case (a), the weld can be considered to be free while in case (b), it is not. And in case (a) the shrinkage is larger than in case (b) and we can imagine that there should be a relation between shrinkage and degree of constraint.

According to Masubuchi (reference 2), to analyze weld distortion, it is necessary to establish analytical relationships among these three sets of parameters and distortion.

For a simple butt weld as is the case of this study, the dimensional changes produced in the structure by each weld are to be determined. This can be done by:

- (1) Analyzing the heat flow,
- (2) Analyzing the thermal stresses during welding to determine incompatible strains, and
- (3) Determining the dimensional changes.

In fusion welding, a weldment is locally heated by the welding heat sources. During the thermal cycle, the weldment is subjected to thermal stresses. When the weld is completed, incompatible strains are created in the region near the weld. Incompatible strains, including dimensional changes associated with solidification of the weld metal, metallurgical transformations, and plastic deformations, are the sources of residual stresses and distortion. When welding processes and parameters are changed, the heat flow pattern is also changed causing a change in the distortion of incompatible strains, hence in shrinkage and distortion.

The problem of determining the distribution of incompatible strains is extremely difficult. When a material undergoes plastic deformation, the stress strain relationship is not linear. Furthermore, plastic properties of the material change with temperature.

When the incompatible strains are known, theoretically or experimentally, the problem of determination of dimensional changes can be handled analytically. Moriguchi has developed a fundamental theory of stresses caused by incompatible strains, and Masubuchi has applied Moriguchi's theory to the study of residual stresses and distortion due to welding.

Assuming that the dimensional changes in welds are determined, either analytically or experimentally, the next step is to determine the distortion induced in the structure by these dimensional changes. Although plastic deformation is produced in small areas

near the weld, most of the remaining material in the structure is elastic. Consequently, the induced distortion can be analyzed by using the elastic assumption. Hence the relations used to determine the induced distortion are independent of fabrication parameters and depend only on well-established material parameters.

A. Changes of Temperature and Stress During Welding (from reference 2)

Figure 1 shows schematically how residual stresses are formed in a weld. Figure 1a shows a bead-on-plate weld in which a weld bead is being laid at a speed v . O - xy is the coordinate axis; the origin, O , is on the surface underneath the welding arc, and the x direction lies in the direction of welding.

Figure 1 shows temperature distribution along several cross sections. Along Section A-A, which is ahead of the welding arc, the temperature change due to welding, ΔT , is almost zero (Figure 1b-1). Along Section B-B, which crosses the welding arc, the temperature distribution is very steep (Figure 1b-2). Along Section C-C, which is some distance behind the welding arc, the distribution of temperature change is as shown in Figure 1b-3. Along Section D-D, which is very far from the welding arc, the temperature change due to welding again diminishes (Figure 1b-4).

Figure 1c shows the distribution of stresses along these sections in the x direction, σ_x . Stress in the y direction, σ_y , and shearing stress, τ_{xy} , also exist in a two-dimensional stress

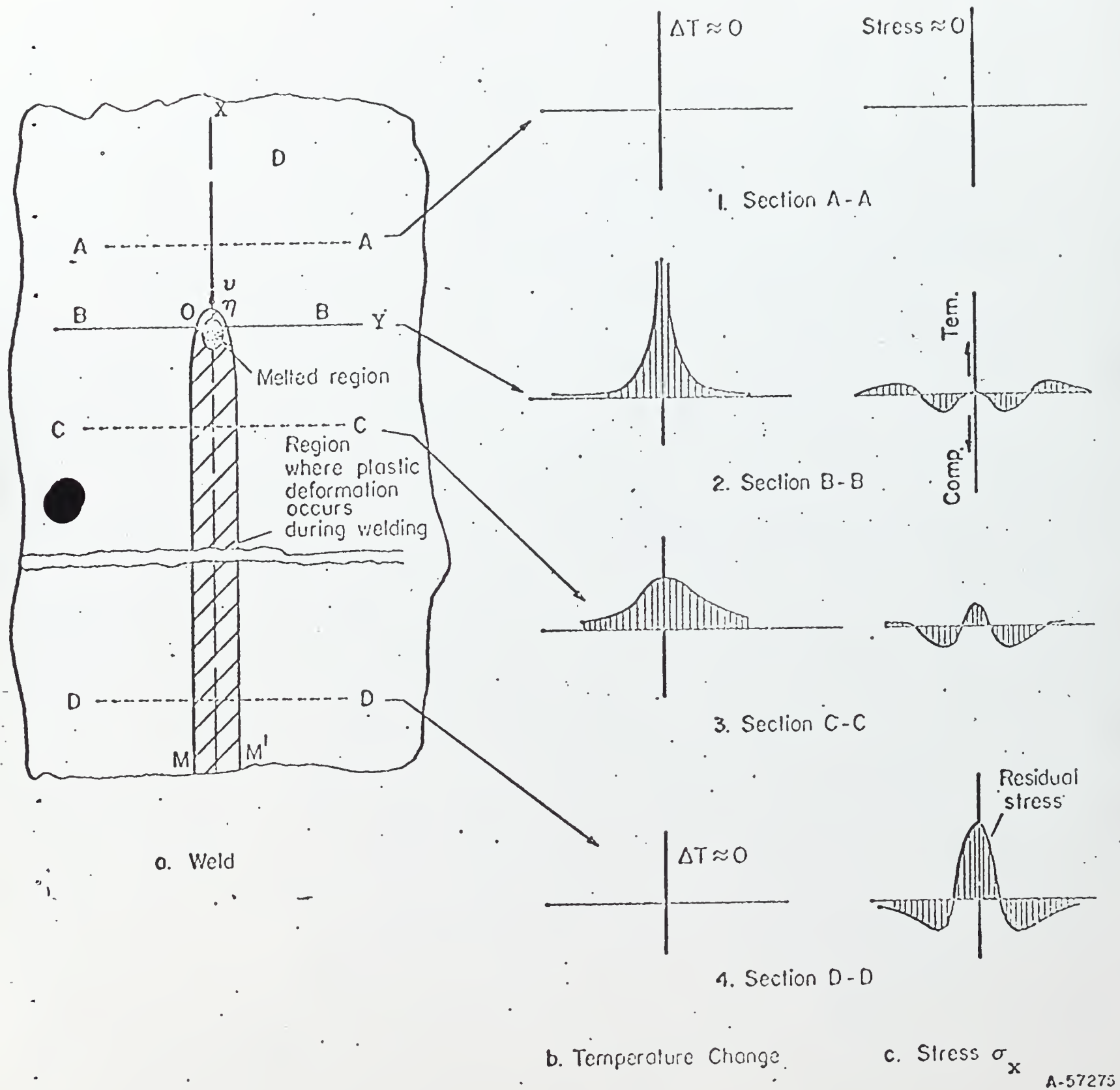


FIGURE 1. SCHEMATIC REPRESENTATION OF CHANGES OF TEMPERATURE AND STRESSES DURING WELDING.

field (Figure 1a).*

Along Section A-A, thermal stresses due to welding are almost zero (Figure 1c-1). The stress distribution along Section B-B is shown in Figure 1c-2. Stresses in areas underneath the welding arc are close to zero, because molten metal does not support loads. Stresses in areas somewhat away from the arc are compressive, because the expansion of these areas is restrained by surrounding areas that are heated to lower temperatures. Since the temperatures of these areas are quite high and the yield strength of the material is low, stresses in these areas are as high as the yield strength of the material at corresponding temperatures. The amount of compressive stress increases with increasing distance from the weld or with decreasing temperature. However, stresses in areas away from the weld are tensile and balance with compressive stresses in areas near the weld. In other words,

$$\int \sigma_x \cdot dy = 0 \quad (a)$$

across Section BB.** Thus, the stress distribution along Section BB is as shown in Figure 1c-2.

Stresses are distributed along Section C-C as shown in

* In a general three-dimensional stress field, six stress components, σ_x , σ_y , σ_z , τ_{xy} , τ_{zy} , τ_{zx} exist.

** Equation (a) neglects the effect of σ_y and τ_{xy} on the equilibrium condition.

Figure 1c-3. Since the weld-metal and base-metal regions near the weld have cooled, they try to shrink causing tensile stresses in areas close to the weld. As the distance from the weld increases, the stresses first change to compressive and then become tensile.

Figure 1c-4 shows the stress distribution along Section D-D. High tensile stresses are produced in areas near the weld, while compressive stresses are produced in areas away from the weld. The distribution of residual stresses that remain after welding is completed are shown in the figure.

The cross-hatched area, MM', in Figure 1a shows the region where plastic deformation occurs during the welding thermal cycle. The cross-hatched area near the origin 0 indicates the region where the metal is melted. The region outside the cross-hatched area remains elastic during the entire welding thermal cycle.

Because of the difficulty in determining the distribution of incompatible strains, no analysis has yet been developed to trace the change of two-dimensional thermal stresses during welding and to determine distributions of three residual-stress components, σ_x , σ_y , and τ_{xy} . In other words, no analysis has been made in which both heat flow and stress fields are treated as two-dimensional problems. In all studies conducted so far, the problem has been simplified in some way.

B. Shrinkage Distortion

Shrinkage distortion in welding can be considered as the

result of the combination of two groups of factors:

- (1) Factors related to welding arc, arc voltage, welding current, welding speed, type and size of electrode,
- (2) Factors related to external constraint.

1 - Effect of Welding Heat

The effect of welding heat on the transverse shrinkage in the case of butt weld free of external constraint is known in the form:

$$S_{tf} = C_1 \frac{A}{b^2} \text{Log} \frac{W}{W_0} + C_2 \left(\frac{A}{b^2}\right)^{1/2} \quad (1)$$

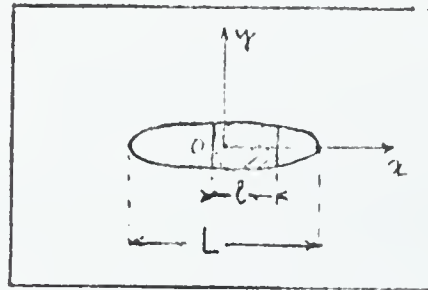
where

- S_{tf} is the transverse shrinkage of the free joint,
- A is the sectional area of groove of the butt joint,
- b is the thickness of the plate,
- W is the weight of deposited metal per unit length of the weld,
- W_0 is the weight of deposited metal per unit length of the weld in one pass, and
- C_1 and C_2 are constants depending on the arc voltage, arc intensity, heat efficiency of the welding arc, size and type of the filler metal and the melted weight of the rod per unit current and unit time.

2 - Effect of External Constraint

In practical work, welding is performed more or less under external constraint. In this case, shrinkage distortion in weld metal is depending also on the mechanical constraints and smaller

than in free joints. In their work, Kihara and Masubuchi attempted to determine quantitatively the degree of constraint and, in a slit weld, to find a relation between transverse shrinkage and degree of constraint.



0 is the center
of the plate

Accordingly, the degree of constraint K is defined as:

$$K = \frac{\sigma_{y_0}}{[\bar{v}]_l} \quad (2)$$

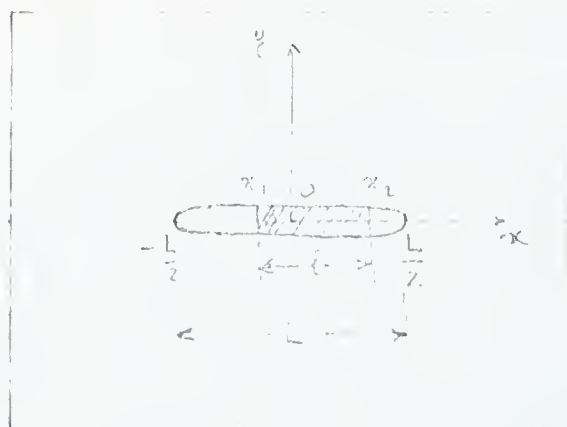
where l is the length of the weld in a slit of length L , σ_{y_0} is the uniform stress applied along the weld length l and $[\bar{v}]_l$ is the corresponding mean value of transverse displacement over the portion of the slit where the load is applied. The physical meaning of K is that when uniform transverse stress σ_{y_0} is applied along the part of the slit between $x=x_1$ and $x=x_2$, ($|x_2-x_1| = l$) displacement v will occur along the slit. The mean value of the transverse displacement $[\bar{v}]_l$ defined by:

$$[\bar{v}]_l = \frac{1}{l} \int_{x_1}^{x_2} v dx \quad \text{is related to } \sigma_{y_0} \text{ by:}$$

$$\sigma_{y_0} = K[v]_l$$

In the case of a slit in an infinite plate, and using the analogy

between the residual stress in this case and the vortex theory in Hydrodynamics, they have shown that (see references 1 and 2):



$$K = \frac{\pi}{2} \frac{E}{L} \frac{\ell}{L} \frac{1}{F} \quad (3)$$

with

$$F = \sum_{n=1}^{\alpha} \left[\int_{\theta_1}^{\theta_2} \sin \theta \sin n \theta d\theta \right]^2$$

where

$$\ell = x_2 - x_1, \quad x_2 > x_1$$

$$\theta_1 = \cos^{-1} \left(\frac{x_1}{L/2} \right)$$

$$\theta_2 = \cos^{-1} \left(\frac{x_2}{L/2} \right)$$

The value of K as a function of $R = \frac{\ell}{L}$ has been computed and the curve $\bar{K} = \frac{K}{E/L} = \frac{\pi}{2} \times \frac{R}{F(R)}$ has been drawn in Figure 2 for the case where the weld is symmetric, that is $x_1 + x_2 = 0$, and $\theta_2 = \pi - \theta_1$ the encircled dots on the diagram are the value of $\bar{K} = \frac{K}{E/L}$ found experimentally. We note that K has the dimension of a stress divided by a length and therefore \bar{K} is dimensionless. In the

experiments described in reference 1, the following results have been obtained:

Slit Length L (mm)	Weld Length ℓ (mm)	$\frac{\ell}{L}$	K (Kg/mm ² /mm)	E/L (Kg/mm ² /mm)	\bar{K}
513	173	0.337	51.6	41.13	0.905
340	164	0.488	56.4	62.06	0.740
174	174	1.000	76.8	121.26	0.636
523	174	0.330	52.0	40.34	0.915
349	175	0.502	55.2	60.46	0.730
174	174	1.000	76.8	121.26	0.636
510	163	0.320	38.3	41.37	0.930
176	176	1.000	76.0	119.89	0.636
171	171	1.000	78.2	123.39	0.636
340	168	0.494	57.0	62.06	0.735
172	172	1.000	77.8	122.67	0.636
337	172	0.510	55.5	62.61	0.725
165	165	1.000	81.0	127.88	0.636
202	202	1.000	66.2	104.46	0.636
224	224	1.000	59.6	94.20	0.636
129	129	1.000	103.5	163.57	0.636
96	96	1.000	139.1	219.79	0.636
390	149	0.382	45.6	54.10	0.840
290	150	0.518	52.2	72.76	0.720

In their report, Kihara and Masubuchi did not mention whether the welds are symmetric or not in the case of $x < 1.00$. But it has been confirmed by Masubuchi that the welds are made symmetrically. The length of the plate is $L_0 = 1200$ mm, its width is $B = 800$ mm, its thickness is $h = 19$ mm. The slit detail is shown in the accompanying figure.

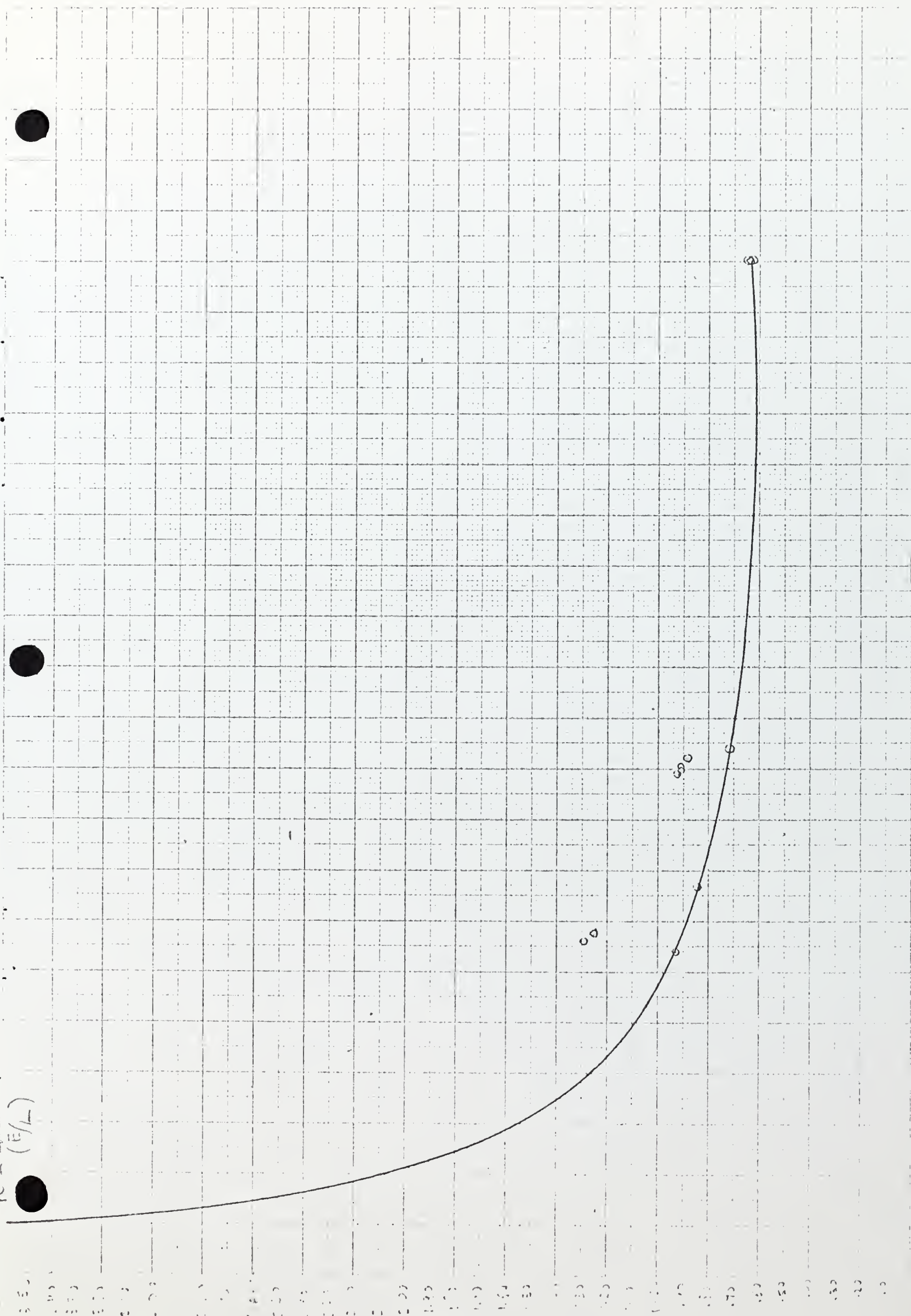
$$R = \frac{E}{L}$$

$$R = \frac{L}{L}$$

WASIN R₁ LINE R2470 100

10 Millimeters to 10 Centimeter

FIG. 2





The experimental values of \bar{K} are higher than those given by the theory, instead of the contrary, since the plates are actually finite and the shrinkages are expected to be larger consequently. There are several reasons for this. One is that the weld cannot be perfectly symmetrical, while the values of K and \bar{K} are lowest in the symmetric case. Another is that the methods of measuring the shrinkages as used by the authors give a lower value than they are actually, since the width of the slit is about 12.8 mm, while the shrinkages are measured along parallel lines which are 45 mm. apart and the value of the shrinkage at that distance of the weld ($\frac{45\text{mm} - 12.8\text{mm}}{2} = 6.1\text{mm}$) is expected to be smaller than they are at the weld.

Using this degree of constraint thus defined, Masubuchi has found a correlation between the mean shrinkage and K in a slit type specimen as reproduced in Figure 3.

Expanding this idea, Watanabe and Satoh (reference 3) later determined the value of K for other configurations such as the H-type and the circular-ring type. Then they found an empirical correlation between the transverse shrinkage S_t and the degree of constraint K for various types of weld in the form:

$$\frac{S_t}{S_{t_f}} = \frac{1}{1 + 0.086K^{0.87}} = F_c$$

S_{tf} being the transverse shrinkage of a free joint which has been defined in the previous part. And they conclude (reference 3) that, "It may be said...that these data are approximately represented by one curve despite the fact that various conditions are different from one to the other. It can be concluded, therefore, that the function $F_c (= \frac{S_t}{S_{tf}})$...or the ratio of shrinkage distortion under external restraint to the one in unrestrained welded joint is decided by K and it is independent of the other conditions." The graph of $\frac{S_t}{S_{tf}} = f(K)$ has been reproduced in Figure 4 with some experimental data for comparison. The value of S_{tf} in the case of butt weld is:

$$S_{tf} = C_1 \frac{A}{h^2} \log_e \frac{W}{W_0} + C_2 \left(\frac{A}{h^2} \right)^{1/2}$$

A: sectional area of groove of butt joint

h: plate thickness

W: weight of deposited metal per unit length

W_0 : weight of deposited metal per unit length per welding of each pass.

In the C.G.S. unit system and with the Ilmenite type, the coefficients C_1 and C_2 have the following values:

Welding Current (A)	Welding Speed (cm/sec)	Size of Electrode (diameter in cm)	C_1	C_2
120	0.3	3.2	0.0960	0.0416
150	0.3	4	0.1021	0.0584
210	0.3	5	0.1530	0.0745
260	0.3	6	0.1249	0.0690

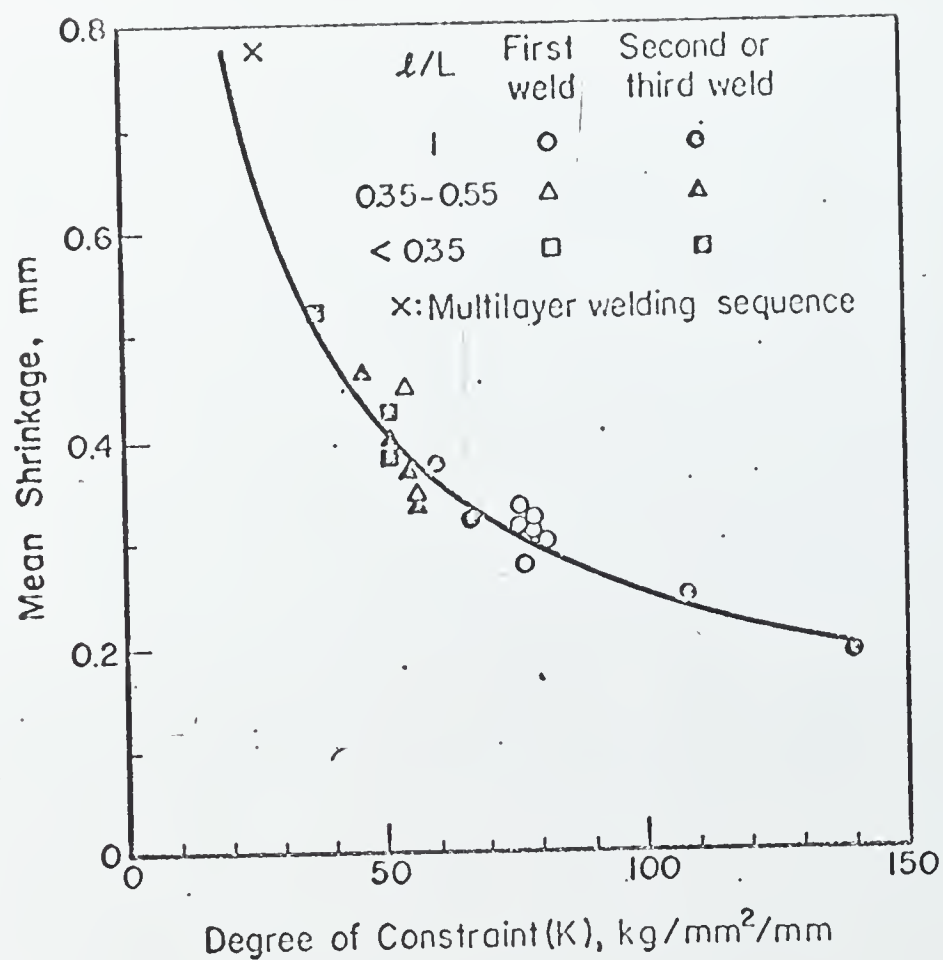


FIGURE 3. RELATIONSHIP BETWEEN DEGREE OF CONSTRAINT AND TRANSVERSE SHRINKAGE IN A SLIT-TYPE SPECIMEN

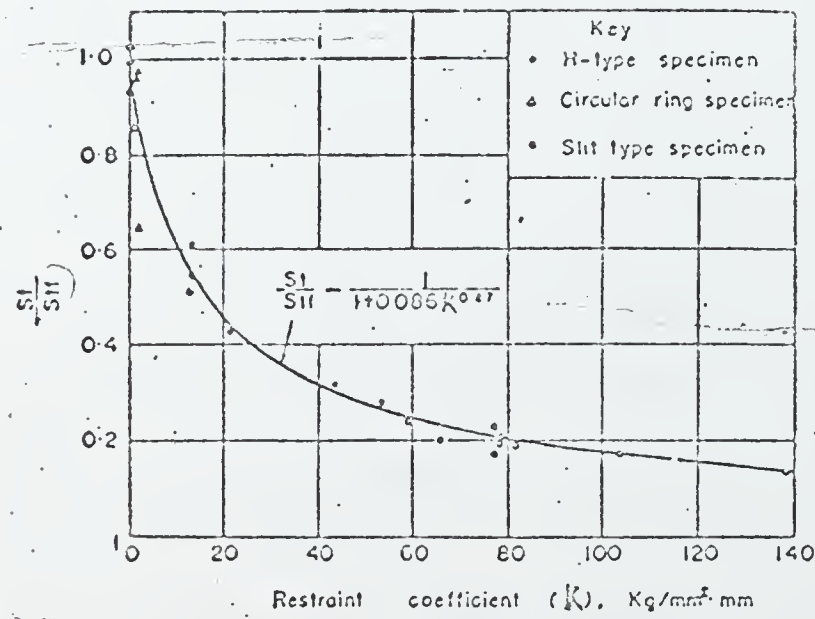
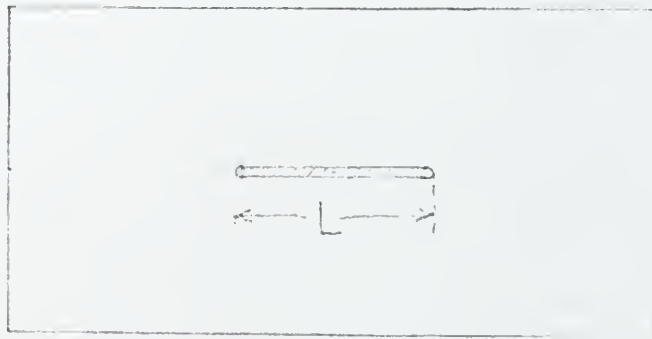


FIGURE 4. Effect of External Constraint on the Transverse Shrinkage of Butt-Welded Joints

III Purpose of the Study

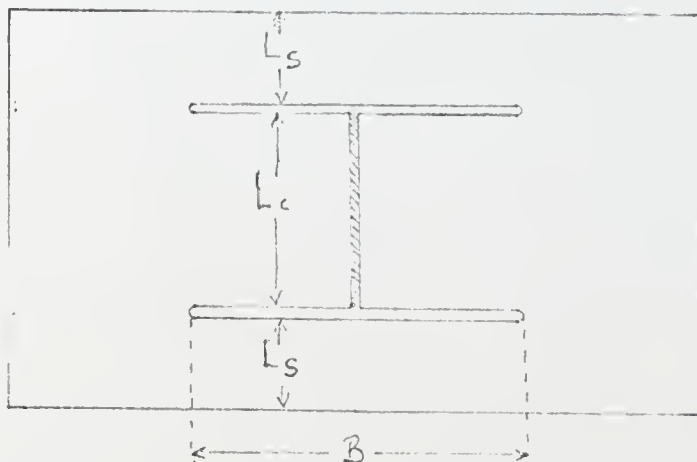
The correlation obtained by Watanabe and Satoh presented in the previous text enables the prediction of the transverse shrinkage and the level of transverse residual stress of a plate due to given welding conditions if the degree of constraint of the weld is known, provided that this empirical correlation is correct. The Watanabe-Satoh correlation has been obtained from a set of experimental data conducted on three types of joints: the straight slit type, the H-slit type and the circular ring type specimen. Some values of K given by Watanabe and Satoh are:



$$K = \frac{2}{\pi} \frac{E}{L}$$

(for an infinite plate)

Straight-Slit Type



$$K = \frac{E}{B} \frac{1}{1 + \left(\frac{L_c}{2L_s} \right)}$$

(No information was given as to the width of the H branches, the length of the plate)

H-Slit Type



$$K = \frac{E}{4\pi} \frac{1}{b-a} \left[\log_e \frac{b}{a} - \frac{b^2 - a^2}{b^2 + a^2} \right]$$

Circular Ring

The straight slit formula has been found by Masubuchi in reference (1) or (2). The circular ring formula can be found by using the elastic theory (Reference: Theory of Elasticity, by Timoshenko, 2nd edition, problem No. 4, page 126). The H-slit formula can be found by using the elastic theory, according to Watanabe and Satoh.

In these three cases, the geometrical boundaries are relatively simple and analytical formulae are possible. Unfortunately, with the probable exception of the ring type, these specimens are not easy to make. Usually to make a slit, it would be easier to begin by drilling two relatively large circular holes at the ends and then cutting the plate along a line joining their centers.



Also, the dimensions of the plate are finite. Then the region is not single-connected any more and analytical formulation becomes very difficult if not impossible, and numerical methods should be used. The same remark can be applied to actual structures.

The purpose of this study is to compute the value of the degree of constraint K for some types of specimens, to propose a method of experimentation which, when performed, will provide a means of verifying the numerical method used in the computation of K .

This numerical method of computing K provides also a method of quantitatively evaluating the cracking susceptibility of a weld. In this case, some experimentation methods have been proposed (see reference 4, page 32-39), such as the Lehigh test, in which the values of K are measured for different specimens. If the value of K is too high the plate will crack and there should be a critical value K_c , or a range of values, of the degree of constraint K for which:

K below the critical range, the plate will not crack, and
 K above the critical range, the plate will crack.

The critical range of K is determined experimentally and could be considered as a material and weld type property. Then if a weld is to be made for a given plate material, its ability to crack can be predicted by computing the value of K of the weld to be made and thus its feasibility can be decided quantitatively before the weld is actually made.

PROCEDURE

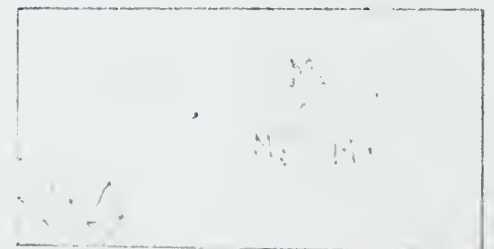
I Mathematical Approach

In most cases, a numerical method will be used which is based on the finite element method of structural analysis developed recently and a summary of which can be found in reference (5). The computer programs for the finite element methods in structure analysis are made available by the Civil Engineering Department of M.I.T., whose user's instructions can be found in reference (7).

The basis of the method is to divide the structure into a finite number of small elements. Within each element, the displacements u and v at each point (x,y) in the x - and y -direction are assumed to be series functions of x and y of the form:

$$u(x,y) = \sum_i \sum_j a_{ij} x^i y^j$$

$$v(x,y) = \sum_i \sum_j b_{ij} x^i y^j$$



a_{ij} and b_{ij} are functions of the coordinates (x_K, y_K) of the nodes M_K limiting the elements. The functions $u(x,y)$ and $v(x,y)$ are such that displacement compatibility is satisfied along the boundaries of the elements to ensure the condition of convergence to the true solution. By the use of the variational method, a system of linear equations between forces and displacements can be derived

and can be solved for forces if displacements are given or vice versa.

The computer programs set up by the Civil Engineering Department for plates are of four types:

- (1) "CSTG": constant strain triangle, global formulation in which the elements are triangles, the strain within each element is assumed to be constant and one global referential system is used for the whole plate.
- (2) "CSTL": constant strain triangle, local formulation. The only difference with the "CSTG" is that each element has its own individual referential system.
- (3) "LST": linear strain triangle. The elements are triangles, the strain within each element is assumed to vary linearly.
- (4) "PSR": plane stress or plane strain rectangle. The elements are rectangles.

The finite element methods provide a powerful means of analysis of structure. Any complicated structure can be investigated without much difficulty. They have, however, their own weaknesses. The input data need to be carefully set up. The results are obtained in the form of numerical answers to the problem and the influence of different factors are not evidenced. Therefore, where it is possible, analytical approach will be used.

II Choice of Appropriate Numerical Method

There are two alternatives in the use of the previously-

mentioned computer programs, namely the constant strain element; "CSTG", "CSTL", "PSR" or the linear strain element "LST."

Therefore the computation of the degree of constraint in the case of a straight slit in a rectangular plate has been made first, using both the constant strain element and the linear strain element programs as means of verifying the adequacy of the methods themselves and a comparison between the two program types since analytical results are available (equation[3], for an infinite plate). Also in the case of constant strain, two types of gridwork are used: one relatively coarse, made of a combination of triangles and rectangles, "CSTG" and "PSR" types, with 105 nodes. The other is made with a finer gridwork, of triangles, "CSTG" type, with 170 nodes. The results are presented in Tables 1 to 6, the loading being symmetrical with respect to the center of the slit. The input and output data are presented in Appendices 1a and 1b for constant strain and in Appendix 2 for linear strain. The symbols used are:

$$R = \frac{\ell}{L}$$

ℓ : loading length

L : length of the slit

v : local transverse displacement (in the direction perpendicular to the slit)

$[\bar{v}]_{\ell}$: average transverse displacement over the loading length ℓ

K : degree of constraint computed

$$K = \frac{\sigma_{Y_0}}{[\bar{v}]_{\ell}}$$

\bar{K} : non-dimensionalized degree of constraint computed:

$$\bar{K} = \frac{K_C}{E/L}$$

E: Young Modulus of Elasticity
L: Length of the slit

\bar{K}_∞ : non-dimensionalized degree of constraint obtained analytically in the case of an infinite plate:

$$\bar{K} = \frac{K_\infty}{E/L}$$

The use of non-dimensionalized \bar{K} (\bar{K}_C or \bar{K}_∞) makes the results somehow comparable in the form of curves relating \bar{K} or \bar{K}_∞ to R and are presented in Figure 5. The difference between \bar{K}_∞ and \bar{K} could not be considered as a measure of the accuracy of the numerical method because \bar{K}_∞ is the non-dimensionalized degree of constraint in an infinite plate and for which the only significant dimension is the slit length L of the weld and \bar{K} is the non-dimensionalized degree of constraint in a finite plate and for which the significant dimensions include the slit length L, the plate length L_0 and the plate width W_0 . But we can expect \bar{K} to be smaller than \bar{K}_∞ since the restraint due to a finite plate should be less than that due to an infinite plate.

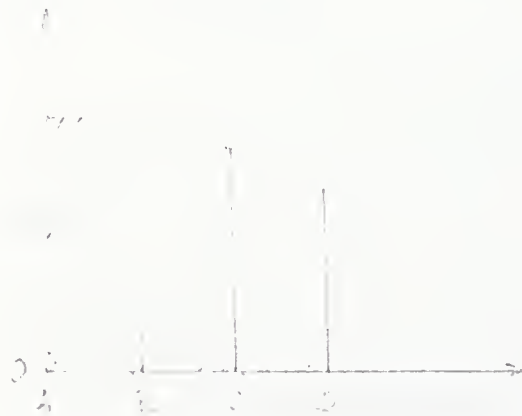
The average transverse displacement $[\bar{v}]_\ell$ is defined as:

$$[\bar{v}]_\ell = \frac{1}{\ell} \int_{-\ell/2}^{\ell/2} v dx$$

for a symmetric weld, where ℓ is the weld length.

In order to determine $[\bar{v}]_\ell$, the local values of v at various nodes where loads are applied, are plotted as a function of

the abscisse x of the nodes. Then a curve (C) is faired in through these points and the area limited by the axis Oy (which is also the axis of symmetry), the ordinate $x = \ell/2$, the curve (C) and the axis Ox is measured graphically by a planimeter.



$$\text{Area} = \int_0^{x_D} v dx$$

A, B, C, D are loaded nodes

$$x_D = \frac{\ell}{2}$$

By dividing the value of this area to $\ell/2$, the average half transverse displacement $\bar{v}/2$ is obtained, since the weld is also symmetrical with respect to Ox and the transverse displacement is the distance which both sides of the weld come in to each other.

From the results in Figure 5 these conclusions could be formulated:

- (1) The linear type gives an unusual swing: the curve of \bar{K} is above that of \bar{K}_∞ for small R and becomes smaller than that of \bar{K} computed by the "CSTG" method for large values of R .
- (2) The constant strain types "CSTG", "PSR" in the two gridworks give more consistent results. The \bar{K} curve obtained is almost parallel to the \bar{K}_∞ curve. Also, there is not much difference between the two gridworks,

one coarse and the other fine.

Therefore, the constant strain element type with a relatively coarse gridwork can be used in the computation of the degree of constraint of various joint configurations in plate structure.

III Units Used

1) Length:

(a) inch

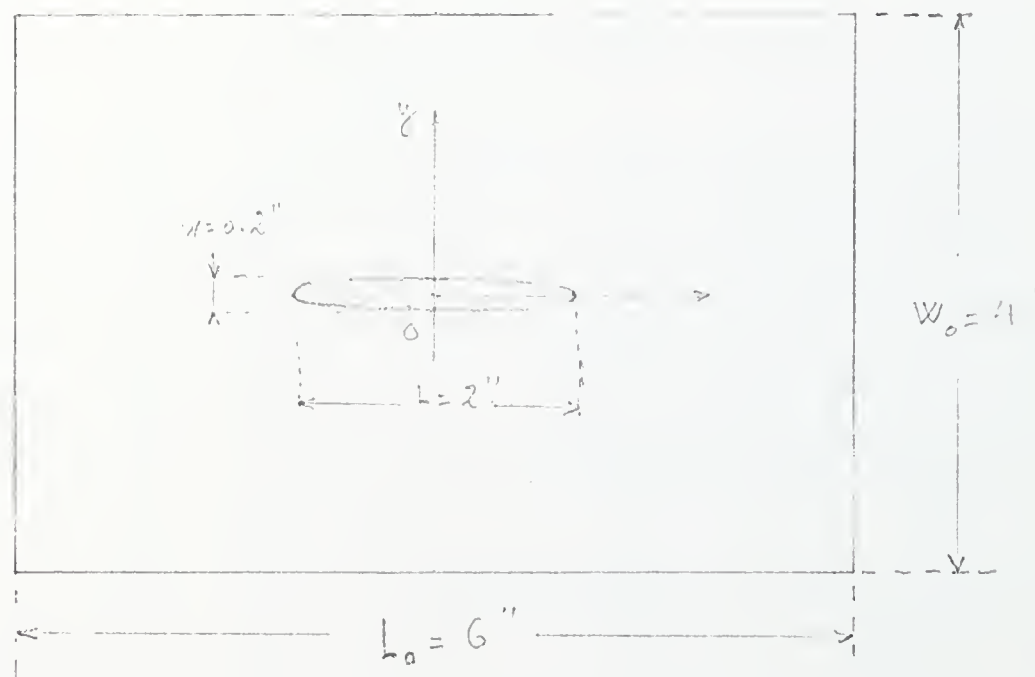
(b) millimeter wherever comparison with Japanese data is desirable.

2) Force:

(a) Pound

(b) Kilogram wherever comparison with Japanese data is desirable.

ELLIPTIC HOLE

Dimension Characteristics:Length of Plate, $L_o = 6''$ Length of Slit, $L = 2''$ Width of Plate, $W_o = 4''$ Maximum Width of Slit, $W = 0.2''$ Plate Thickness, $T = 0.2''$ $\frac{\text{Large Axis } a}{\text{Small Axis } b} = 10$ Mechanical Characteristics:Force Applied = 2×10^5 lb/in

$$\sigma_{y_o} = 10^6 \text{ psi}$$

Young's Modulus, $E = 30 \times 10^6$ psi

$$\frac{E}{L} = 15 \times 10^6 \text{ psi/in}$$

TABLE 1

Node Displacements in the Y-Direction (in 10^{-2} inches), Constant Strain Elements

Node Abscisse (inches)	Node Names										Average half transverse displace- ment $\bar{V}(10^{-2}\text{in})$	$R=\frac{\ell}{L}$
	1	9	11	18	20	27	29	36	38	45	47	
0.0	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	
1.902	1.626											0.1
3.318	3.140	2.722										0.2
4.493	4.355	4.070	3.527									0.3
5.491	5.378	5.160	4.763	4.104								0.4
6.348	6.251	6.071	5.730	5.221	4.442							0.5
7.079	6.991	6.829	6.519	6.084	5.451	4.542						0.6
7.687	7.604	7.452	7.161	6.766	6.187	5.424	4.353					0.7
8.166	8.066	7.939	7.657	7.281	6.729	6.030	5.091	3.774				0.8
8.503	8.424	8.279	8.001	7.634	7.096	6.427	5.530	4.336	2.753			0.9

TABLE 2

Values of the Degree of Constraint K and the Non-Dimensionalized Degree of Constraint $\bar{K} = \frac{K}{(E/L)}$ for Different Values of $R = \frac{\ell}{L}$ (Constant Strain Element)

$R = \frac{\ell}{L}$	$\bar{v}/2$ (10^{-2} in)	K (10^6 psi/in)	\bar{K}	\bar{K}_∞
0.1	1.797	27.824	1.855	2.079
0.2	3.125	16.000	1.067	1.268
0.3	4.192	11.927	0.795	0.975
0.4	5.039	9.923	0.662	0.823
0.5	5.781	8.649	0.577	0.731
0.6	6.315	7.918	0.528	0.673
0.7	6.730	7.429	0.495	0.637
0.8	6.904	7.242	0.483	0.617
0.9	6.866	7.282	0.485	0.614

TABLE 3

Node Displacements in the Y-Direction (in 10^{-2} inches)
Constant Strain Elements - Finer Gridwork -

Node Abscisse (inches)	Node Names											Average Half Displacement $\bar{v}/2$ (10^{-2} in)	$R=\frac{\ell}{L}$
	1	16	21	29	34	43	48	56	61	70	75		
	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0		
1.852	1.625											1.725	0.1
3.263	3.120	2.691										3.098	0.2
4.426	4.326	4.029	3.489									4.157	0.3
5.421	5.344	5.096	4.698	4.047								5.000	0.4
6.273	6.208	5.988	5.658	5.152	4.388							5.725	0.5
6.999	6.941	6.738	6.446	5.993	5.377	4.481						6.222	0.6
7.602	7.547	7.355	7.082	6.656	6.106	5.349	4.293					6.577	0.7
8.080	8.027	7.840	7.577	7.168	6.650	5.942	5.024	3.782				6.804	0.8
8.415	8.364	8.179	7.921	7.520	7.017	6.327	5.460	4.338	2.679			6.780	0.9

TABLE 4

Values of the Degree of Constraint K and the Non-Dimensionalized Degree of Constraint $\bar{K} = \frac{K}{(E/L)}$ for Different Values of $R = \frac{\ell}{L}$
(Constant Strain Elements - Finer Gridwork)

$R = \frac{\ell}{L}$	$\bar{v}/2$ (10^{-2} in)	K (10^6 psi/in)	\bar{K}	\bar{K}_∞
0.1	1.725	28.986	1.932	2.079
0.2	3.098	16.139	1.075	1.268
0.3	4.157	12.028	0.802	0.975
0.4	5.000	10.000	0.667	0.823
0.5	5.725	8.734	0.582	0.731
0.6	6.222	8.035	0.536	0.673
0.7	6.577	7.602	0.507	0.637
0.8	6.804	7.349	0.490	0.617
0.9	6.780	7.375	0.492	0.614

TABLE 5

Node Displacements in the Y-Direction (10^{-2} inches) - Linear Strain Elements

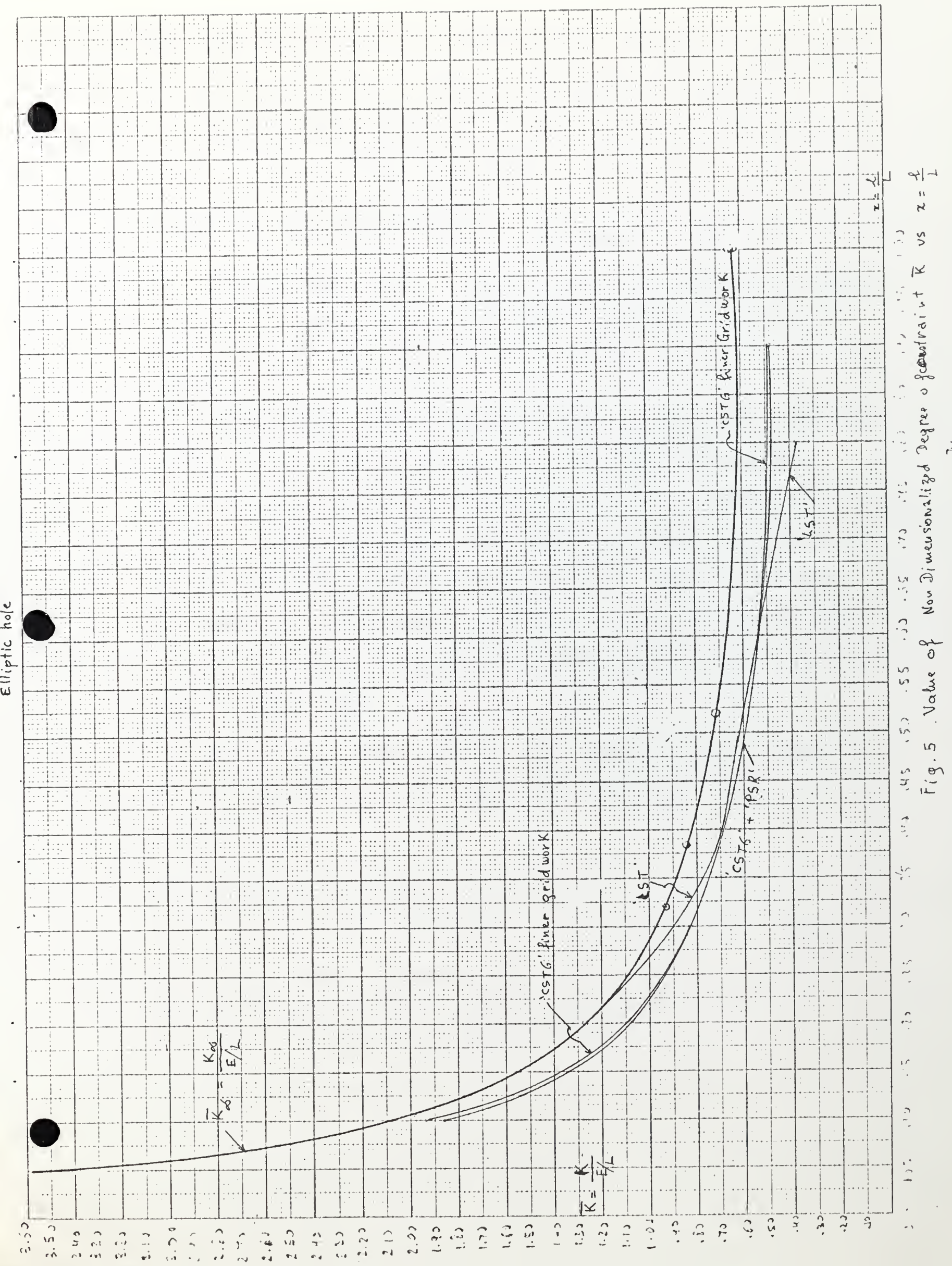
Node Names															
	1	113	9	129	11	138	18	153	20	162	27	177	29	186	36
Node Abscisse (inches)	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70
	2.565	2.670	2.705	2.459	2.138										
	4.895	5.020	5.115	5.009	4.971	4.759	4.598	4.203	3.742						
	6.664	6.772	6.877	6.789	6.779	6.617	6.537	6.295	6.130	5.795	5.513	4.999	4.410		
	7.904	8.033	8.141	8.059	8.056	7.905	7.840	7.619	7.483	7.198	6.994	6.629	6.333	5.855	5.417

								Average Half Displacement $\bar{v}/2$ (10^{-2} in)	$R = \frac{\bar{v}}{L}$
186	36	201	38	210	45	225	47		
0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00		
								2.617	0.2
								4.805	0.4
								6.302	0.6
5.855	5.417	4.736	3.949					7.051	0.8

TABLE 6

Values of the Degree of Constraint K and the
 Non-Dimensionalized Degree of Constraint $\bar{K} = \frac{K}{(E/L)}$
 for Different Values of $R = \frac{\ell}{L}$
 (Linear Strain Elements)

$R = \frac{\ell}{L}$	$\bar{v}/2$ (10^{-2} in)	K (10^6 psi/in)	\bar{K}	\bar{K}_∞
0.2	2.617	19.106	1.274	1.268
0.4	4.805	10.406	0.694	0.823
0.6	6.302	7.934	0.529	0.673
0.8	7.051	7.091	0.473	0.617

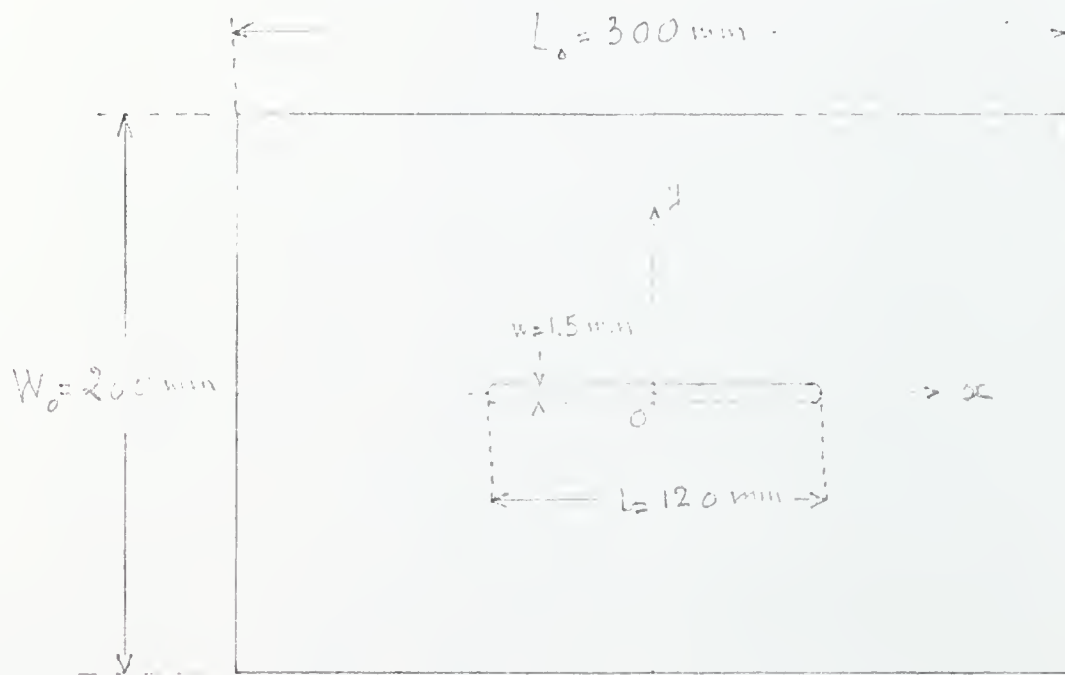


RESULTS

I Presentation of the Results

- A. Straight Slit Type - The results are assembled in tables 7 and 8 and in Figure 6; the input and output data are in Appendix 3.
- B. Straight Slit with Circular Holes at the Ends - The results are in Tables 9 and 10 for the "CSTG" type and in Tables 11 and 12 for the "LST" type and are assembled in Figure 7 for both types. The input and output data are in Appendices 4 for "CSTG" and 5 for "LST." Here again the two methods, "CSTG" and "LST" are used in order to compare them again because the weld configuration is different from the previous cases.
- C. H-Slit Type, Steel Plate - The results are in Tables 13 and 14 and in Figure 8. The input and output data are in Appendix 6.
- D. Lehigh Test Specimen - The results are in Tables 15 and 16. The input and output data are in Appendices 7a and 7b.
- E. H-Slit Type, Aluminum Plate - The results are in Table 17. The input and output data are in Appendix 8.

STRAIGHT SLIT HOLE

Dimension Characteristics:

Length of Plate, $L_o = 300$ mm

Length of Slit, $L = 120$ mm

Width of Plate, $W_o = 200$ mm

Width of Slit, $W = 1.5$ mm

Plate Thickness = 5 mm

Mechanical Characteristics:

Force Applied = 5000 Kg/mm

$$\sigma_{y_o} = 1000 \text{ Kg/mm}^2$$

Young's Modulus $E = 21,100 \text{ Kg/mm}^2$

$$\frac{E}{L} = \frac{21,100}{120} = 175.8 \text{ Kg/mm}^2\text{-mm}$$

TABLE 7

Node Displacements in the Y-Direction (Millimeters)

Node Abscisse (mm)	Node Names												Average Half Displace- ment $\bar{V} \text{ (mm)}$	$R = \frac{\bar{V}}{L}$
	1	8	13	15	18	20	26	28	31	33	39	41	44	
0.		5.	10.	15.	20.	25.	30.	35.	40.	45.	50.	55.	60.	$R = \frac{\bar{V}}{L}$
4.222	4.165	4.012	3.759	3.320										3.926
5.600	5.549	5.420	5.223	4.951	4.590	4.041								5.091
6.691	6.642	5.524	6.346	6.107	5.800	5.400	4.876	4.144						5.918
7.495	7.448	7.333	7.161	6.928	6.628	6.247	5.773	5.197	4.506	3.569				6.305
7.943	7.896	7.783	7.611	7.379	7.080	6.703	6.239	5.686	5.037	4.225	3.134	1.375		6.133

TABLE 8

Values of the Degree of Constraint K and the
Non-Dimensionalized Degree of Constraint $\bar{K} = \frac{K}{(E/L)}$

for Different Values of $R = \frac{\ell}{L}$

$R = \frac{\ell}{L}$	$\bar{v}/2$ (mm)	K (Kg/mm ² -mm)	\bar{K}	\bar{K}_∞
1/3	3.926	127.36	0.724	0.943
1/2	5.091	98.21	0.559	0.731
2/3	5.918	84.49	0.481	0.649
5/6	6.305	79.30	0.451	0.615
1	6.133	81.53	0.464	0.637

Straight Slit

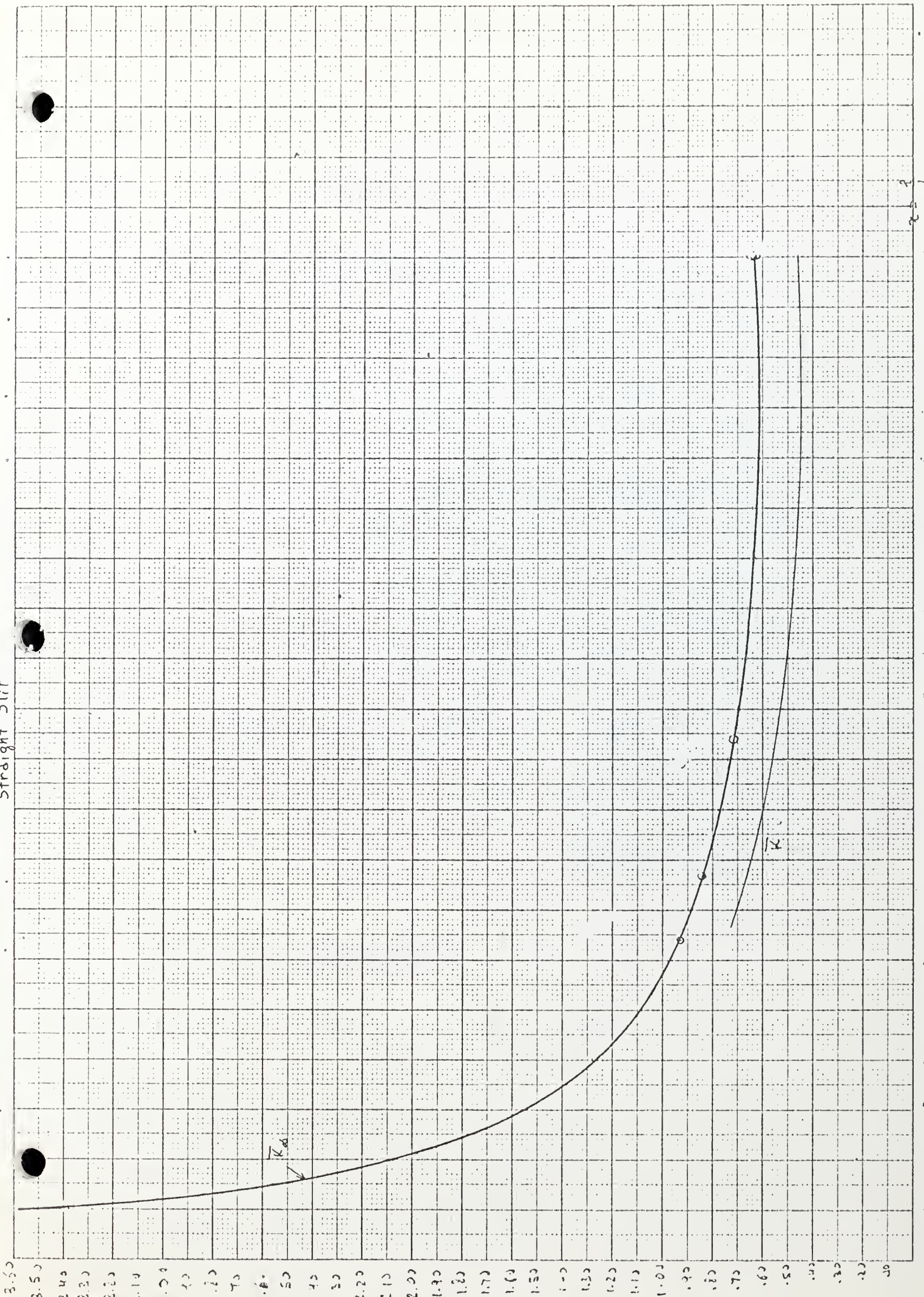


Fig. 6 Degree of Constraint \bar{K} vs weld length $\frac{1}{2}x$

STRAIGHT SLIT, CIRCLED ENDS

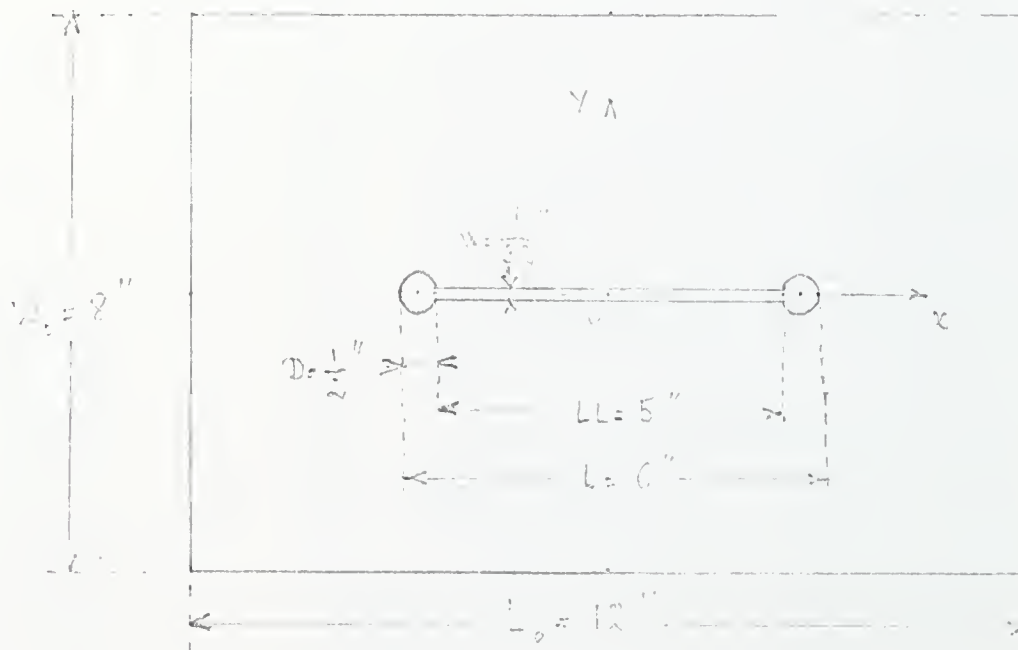
Dimension Characteristics:Length of Plate, $L_o = 12"$ Slit Overall Length, $L = 6"$ Width of Plate, $W_o = 8"$ Loading Length, $LL = 5"$ Plate Thickness, $T = 0.1"$ End Circle Diameter, $D = 0.5"$ Width of Slit Along Loading Length, $W = \frac{1}{32}"$ Mechanical Characteristics:Force Applied $= 8 \times 10^3$ lb/in $\sigma_{y_o} = 8 \times 10^4$ psiYoung's Modulus $E = 30 \times 10^6$ psi $\frac{E}{LL} = 6 \times 10^6$ psi/in

TABLE 9

Node Displacements in the Y-Direction (10^{-2} in)
Constant Strain Elements

Node Abscisse (inches)	Node Names											Average Half Displace- ment $\bar{v}/2$ (10^{-2} in)	$R = \frac{\bar{\epsilon}}{\bar{\epsilon}_L}$
	1	9	16	24	26	32	39	47	49	55	62		
0.0	0.0	0.25	0.50	0.75	1.00	1.25	1.50	1.75	2.00	2.25	2.503		
0.868	0.831	0.750										0.820	0.2
1.510	1.483	1.431	1.348	1.210								1.414	0.4
2.030	2.005	1.959	1.887	1.785	1.653	1.466						1.840	0.6
2.441	2.417	2.372	2.302	2.209	2.088	1.934	1.745	1.491				2.132	0.8
2.742	2.717	2.672	2.602	2.509	2.389	2.239	2.059	1.838	1.585	1.282		2.261	1.0

TABLE 10

Values of the Degree of Constraint K , the
 Non-Dimensionalized Degree of Constraint $\bar{K} = \frac{K}{E/L}$
 and the Specific Degree of Constraint $K' = \frac{K}{E}$

for Different Values of $R = \frac{\ell}{L}$
 (Constant Strain Elements)

$R = \bar{L}$	$\bar{v}/2$ (10^{-2} in)	K (10^6 psi/in)	\bar{K}	\bar{K}	K' (in $^{-1}$)
0.2	0.820	4.878	0.813	1.268	0.163
0.4	1.414	2.829	0.472	0.823	0.0943
0.6	1.840	2.174	0.362	0.673	0.07247
0.8	2.132	1.876	0.313	0.617	0.0625
1.0	2.261	1.769	0.295	0.636	0.0590

Table 11

Node Displacements in the Y-Direction (J

	Node Names									
	1	147	9	164	16	178	24	193	26	201
Node Abscisse (inches)	0.0	0.125	0.25	0.375	0.50	0.625	0.75	0.875	1.00	1.125
	0.489	0.466	0.457	0.401	0.344					
	0.718	0.697	0.693	0.653	0.631	0.582	0.556	0.502	0.457	
	0.896	0.874	0.869	0.829	0.807	0.766	0.754	0.730	0.738	0.726
	1.051	1.028	1.022	0.980	0.957	0.916	0.909	0.894	0.916	0.923
	1.174	1.151	1.144	1.100	1.076	1.033	1.028	1.017	1.047	1.064

(10^{-2} in), Linear Strain Elements

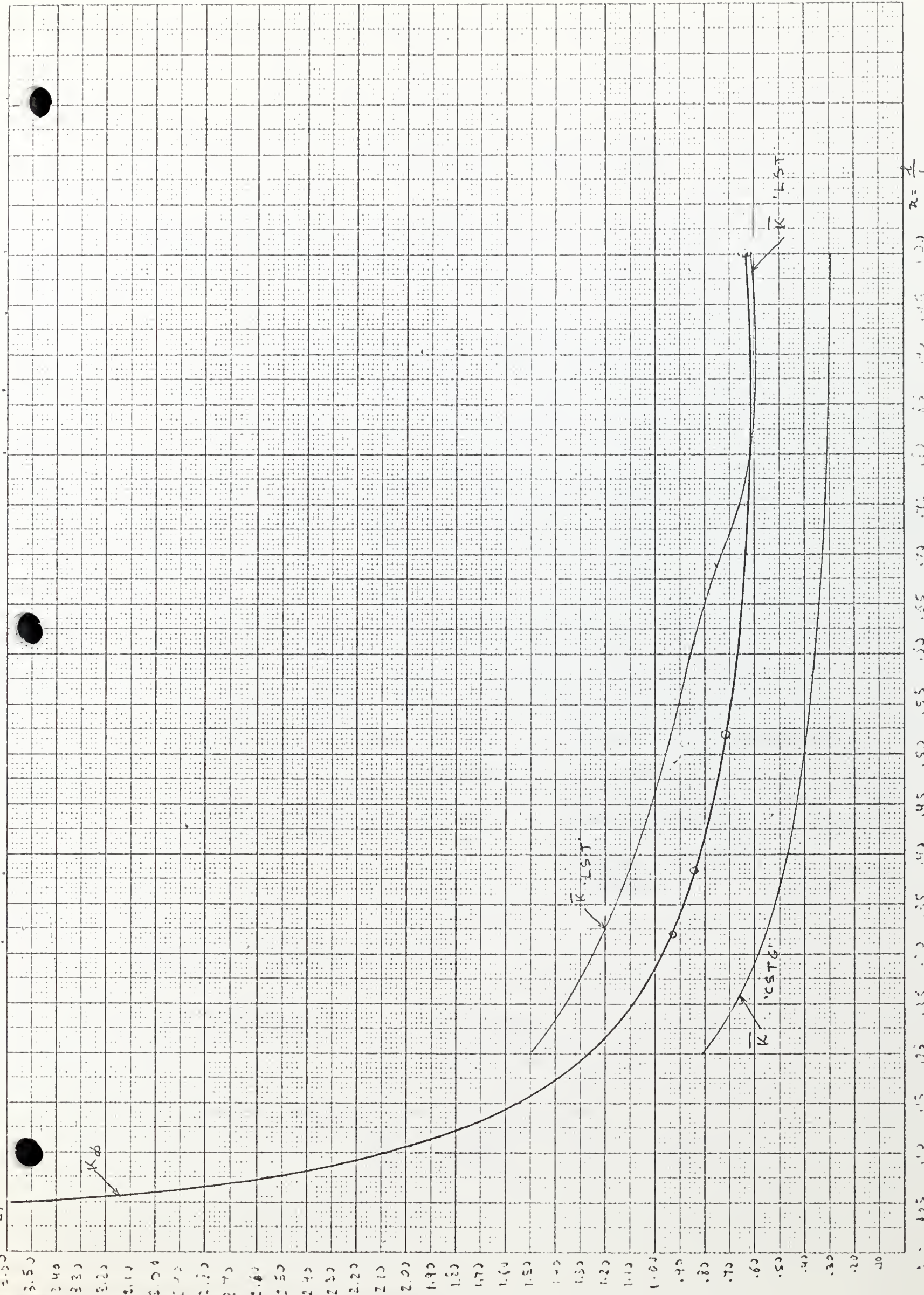
											Average Half Displace- ment $\bar{v}/2$ (10^{-2} in)	$R = \frac{l}{L}$
32	216	39	300	47	315	49	323	55	338	62		
1.25	1.375	1.50	1.625	1.75	1.875	2.00	2.125	2.25	2.12502	2.503		
											0.445	0.2
											0.620	0.4
0.730	0.690	0.645									0.777	0.6
0.953	0.948	0.954	0.924	0.903	0.836	0.765					0.944	0.8
1.106	1.112	1.131	1.116	1.115	1.076	1.050	0.990	0.941	0.852	0.774	1.070	1.0

TABLE 12

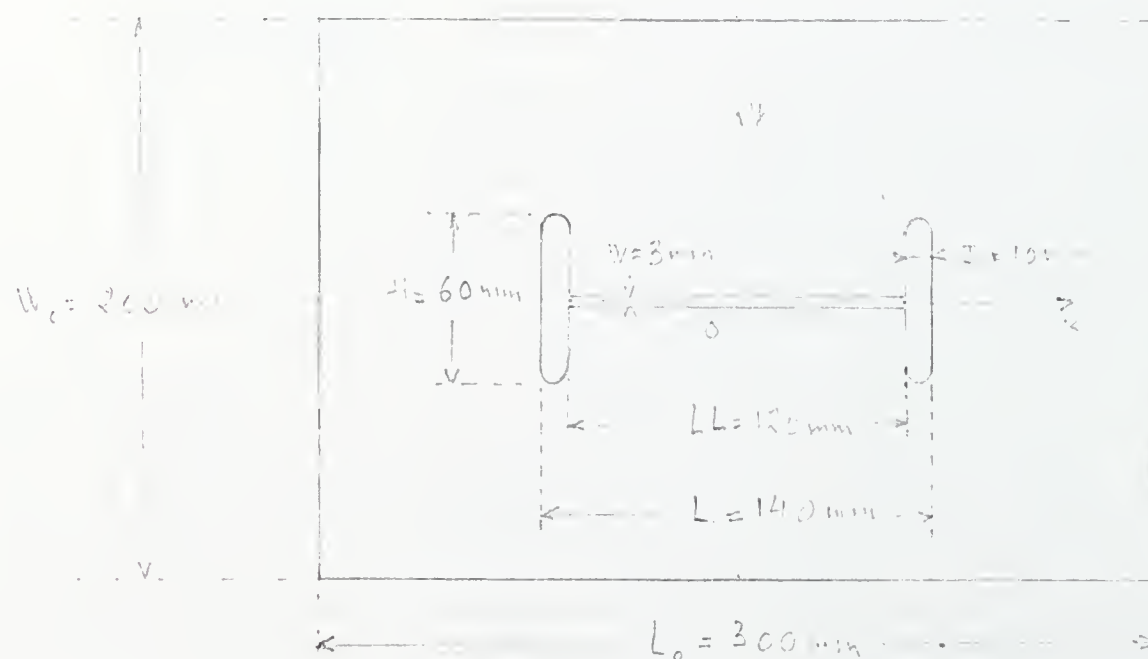
Values of the Degree of Constraint K , the
 Non-Dimensionalized Degree of Constraint $\bar{K} = \frac{K}{(E/L)}$
 and the Specific Degree of Constraint $K' = K/E$
 (Linear Strain Elements)

$R = \frac{\ell}{L}$	$\bar{v}/2$ (10^{-2} in)	K (10^6 psi/in)	\bar{K}	\bar{K}_∞	K' (in^{-1})
0.2	0.445	8.989	1.498	1.268	0.300
0.4	0.620	6.452	1.075	0.823	0.215
0.6	0.777	5.148	0.858	0.673	0.172
0.8	0.944	4.237	0.706	0.617	0.141
1.0	1.070	3.738	0.623	0.636	0.125

Fig. 7 Degree of constraint \bar{K} vs. weld length $\frac{L}{d}$



H-SLIT HOLE - STEEL PLATE

Dimension Characteristics:Length of Plate, $L_o = 300 \text{ mm}$ Slit Overall Length, $L = 140 \text{ mm}$ Width of Plate, $W_o = 200 \text{ mm}$ Loading Length, $LL = 120 \text{ mm}$ Plate Thickness, $T = 5 \text{ mm}$ H-Branch Width, $D = 10 \text{ mm}$ H-Branch Overall Height, $H = 60 \text{ mm}$ Mechanical Characteristics:Force Applied = 50 Kg/mm

$$\sigma_{Y_o} = 10 \text{ Kg/mm}^2$$

Young's Modulus $E = 21,100 \text{ Kg/mm}^2$

$$\frac{E}{LL} = \frac{21,100}{120} = 175.83 \text{ Kg/mm}^2\text{-mm}$$

TABLE 13

Displacements in the Y-Direction (10^{-2} mm)

Node Names									Average Half Displacement $\bar{v}/2$ (10^{-2} mm)	$R = \frac{\ell}{LL}$
20	22	26	28	36	38	42	48	57		
20	25	30	35	40	45	50	55	60		
02	5.130								5.762	1/3
54	7.650	7.287	6.709						7.839	1/2
72	9.710	9.402	9.207	8.566	7.909				9.551	2/3
88	11.489	11.208	10.865	10.493	10.033	9.543	8.896		11.03	5/6
01	13.059	12.792	12.481	12.151	11.781	11.423	11.114	10.825	10.610	1

TABLE 13

Node Displacements in the Y-Direction (10^{-4})

	Node Names								
	1	9	13	15	20	22	26	28	36
Node Abcisse (mm)	0	5	10	15	20	25	30	35	40
	6.040	5.996	5.823	5.592	5.130				
	8.316	8.282	8.141	7.954	7.650	7.287	6.709		
	10.308	10.276	10.146	9.972	9.710	9.402	9.207	8.566	7.909
	12.061	12.030	11.905	11.738	11.489	11.208	10.865	10.493	10.033
	13.616	13.585	13.463	13.301	13.059	12.792	12.481	12.151	11.781

TABLE 14

Values of the Degree of Constraint, the
Non-Dimensionalized Degree of Constraint $\bar{K} = \frac{K}{(E/LL)}$

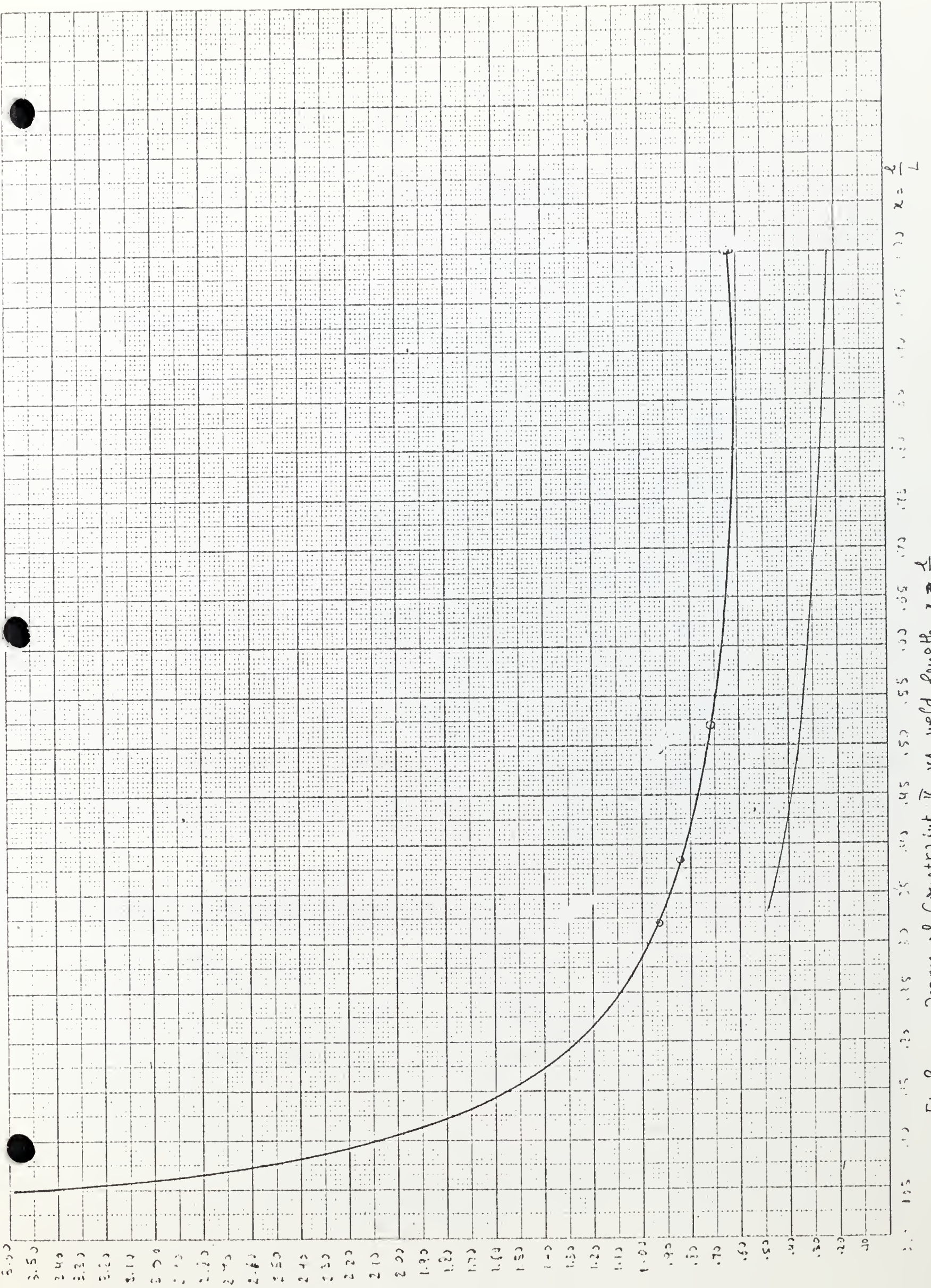
and the Specific Degree of Constraint $K' = K/E$

for Different Values of $R = \ell/LL$

$R = \frac{\ell}{LL}$	$\frac{\bar{v}}{2}$ (10^{-2} mm)	K (Kg/mm ² -mm)	\bar{K}	\bar{K}_{∞}	K' (mm ⁻¹)
1/3	5.762	86.78	0.493	0.943	4.164×10^{-3}
1/2	7.839	63.78	0.363	0.731	3.023×10^{-3}
2/3	9.551	52.35	0.298	0.649	2.481×10^{-3}
5/6	11.03	45.83	0.258	0.615	2.172×10^{-3}
1	12.36	40.45	0.230	0.637	1.917×10^{-3}

Fig. 8

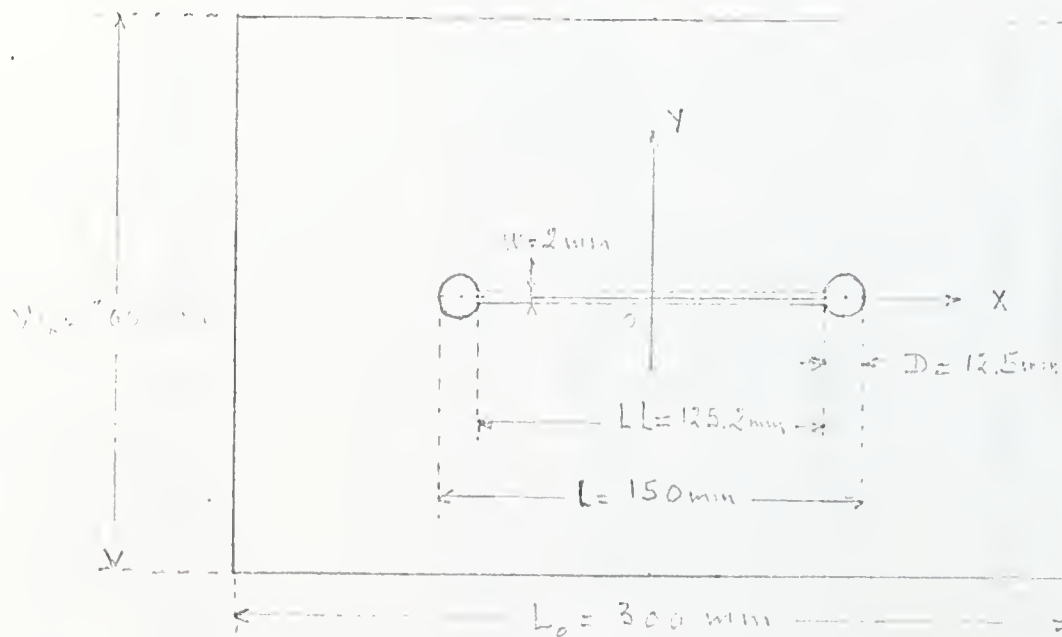
Degree of Constraint \bar{K} vs. weld length $x = \frac{L}{2}$



LEHIGH SPECIMEN

(No Sawcut)

Dimension Characteristics:



Length of Plate, $L_o = 300 \text{ mm}$

Slit Overall Length, $L = 150 \text{ mm}$

Width of Plate, $W_o = 200 \text{ mm}$

Loading Length, $LL = 125.2 \text{ mm}$

Plate Thickness, $T = 10 \text{ mm}$

End Circle Diameter, $D = 12.5 \text{ mm}$

Slit Width, $W = 2 \text{ mm}$

Mechanical Characteristics:

Force Applied $= 10^3 \text{ Kg/mm}$

$\sigma_{y_o} = 10^2 \text{ Kg/mm}^2$

Young's Modulus $E = 21,100 \text{ Kg/mm}^2$

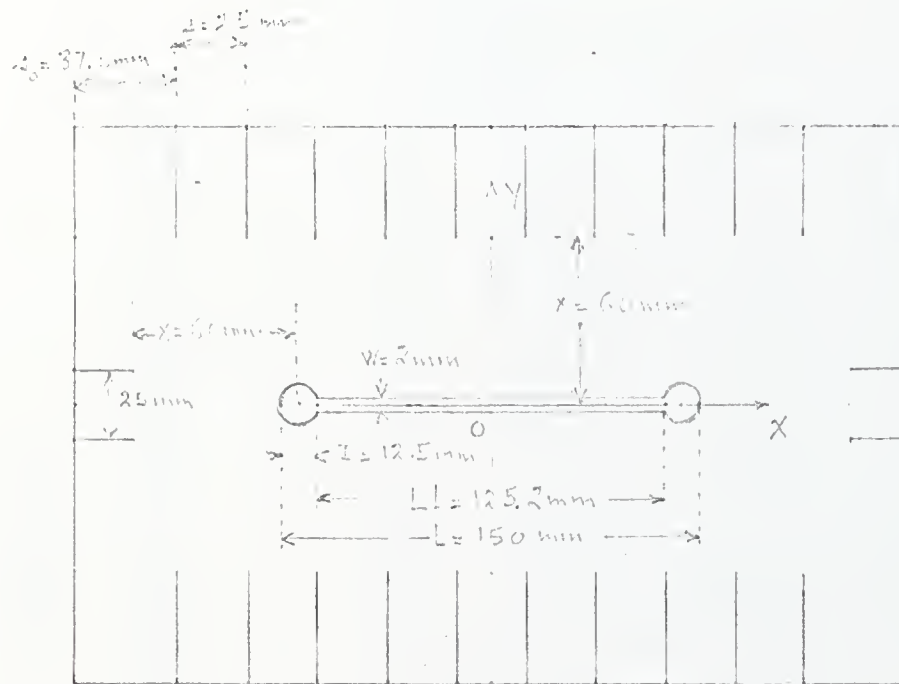
TABLE 15
Results of the Lehigh Specimen Without Sawcut

	Node Names								Average Half Displace- ment $\bar{v}/2$ (mm)	K (Kg/mm ² -m)	K measured [*] (Kg/mm ² -m)
	1	17	44	52	78	89	103	114			
Node Abscisse (mm)	0	10	20	30	40	50	60	62.6			
Node Displace- ments (mm)	1.238	1.222	1.176	1.099	0.989	0.840	0.644	0.578	1.038	48.17	44

* K_{measured} is obtained from a Japanese paper
given to me by Professor Masabuchi

LEHIGH SPECIMEN

(With Saw Cut)

Dimension Characteristics:

Saw cut width = 1mm

Saw cut spacing, $s = 25 \text{ mm}$ Saw cut length determined by $x = 60 \text{ mm}$

Other characteristics remain unchanged.

TABLE 16

Results of the Lehigh Specimen with Sawcut

	Node Names								Average Half Displace- ment $\bar{v}/2$ (mm)	K (Kg/mm ² -m)	K measured [*] (Kg/mm ² -m)
	1	17	44	52	78	89	103	114			
Node Abscisse (mm)	0	10	20	30	40	50	60	62.6			
Node Displace- ments (mm)	2.019	1.987	1.894	1.743	1.535	1.270	0.945	0.842	1.629	30.69	
										27	

* K_{measured} is obtained from a Japanese paper
given to me by Professor Masabuchi

H-SLIT HOLE, ALUMINUM PLATE

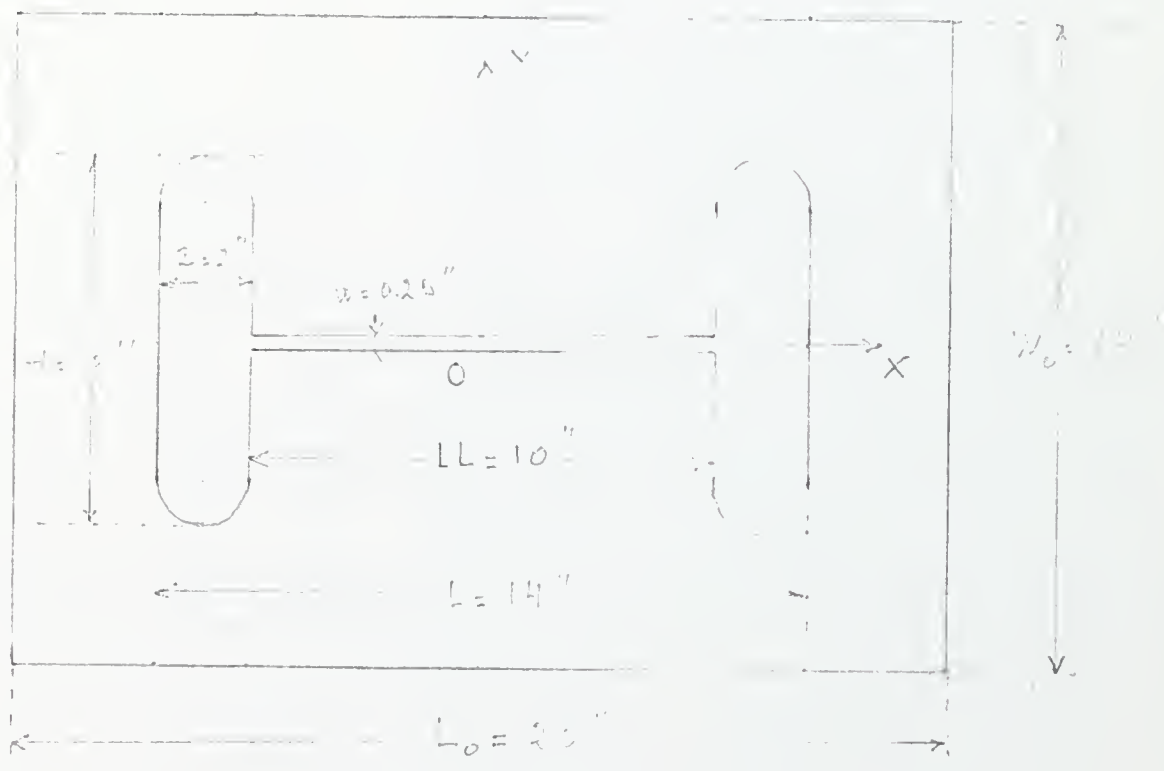
Dimension Characteristics:Length of Plate, $L_0 = 20"$ Width of Plate, $W_0 = 14"$ Plate Thickness, $T = 0.5"$ Slit Overall Length, $L = 14"$ Loading Length, $LL = 12"$ H-Branch Width, $D = 2"$ H-Branch Overall Height, $H = 8"$ Mechanical Characteristics:Force Applied $= 5 \times 10^3$ lb/in $\sigma_{Y_0} = 10^4$ psiYoung's Modulus $E = 10 \times 10^6$ psi

TABLE 17

Result of the H-Slit, Aluminum Plate

	Node Names											
	1	9	13	20	24	32	36	43	47	57	66	81
Node Abscisse (inches)	0.0	0.4	0.8	1.2	1.6	2.0	2.4	2.8	3.2	3.6	4.0	4.4
Node Displace- ment $v/2(10^{-2}\text{in})$	7.34	7.33	7.31	7.26	7.21	7.13	7.05	6.97	6.88	6.80	6.72	6.66

TABLE 17

Result of the H-Slit, Aluminum Plate

..

Node Names										Average Half Displace- ment $\bar{v}/2$ (10^{-2} in)	K (10^4 psi/in)
24	32	36	43	47	57	66	81	90	102		
1.6	2.0	2.4	2.8	3.2	3.6	4.0	4.4	4.8	5.0		
7.21	7.13	7.05	6.97	6.88	6.80	6.72	6.66	6.61	6.58	7.005	7.14

II. Discussion Of Results

A. Interpretation of the Results

The valid results for different joint configurations are assembled in Figure 9.

As expected, the \bar{K} value for a finite plate is smaller than that for an infinite plate. The effect of finiteness is also evidenced by the difference in the \bar{K} value between the elliptic slit and the straight slit. In the first case, if we refer to page 35 we see that the ratio between the plate length L_o and the slit length L is:

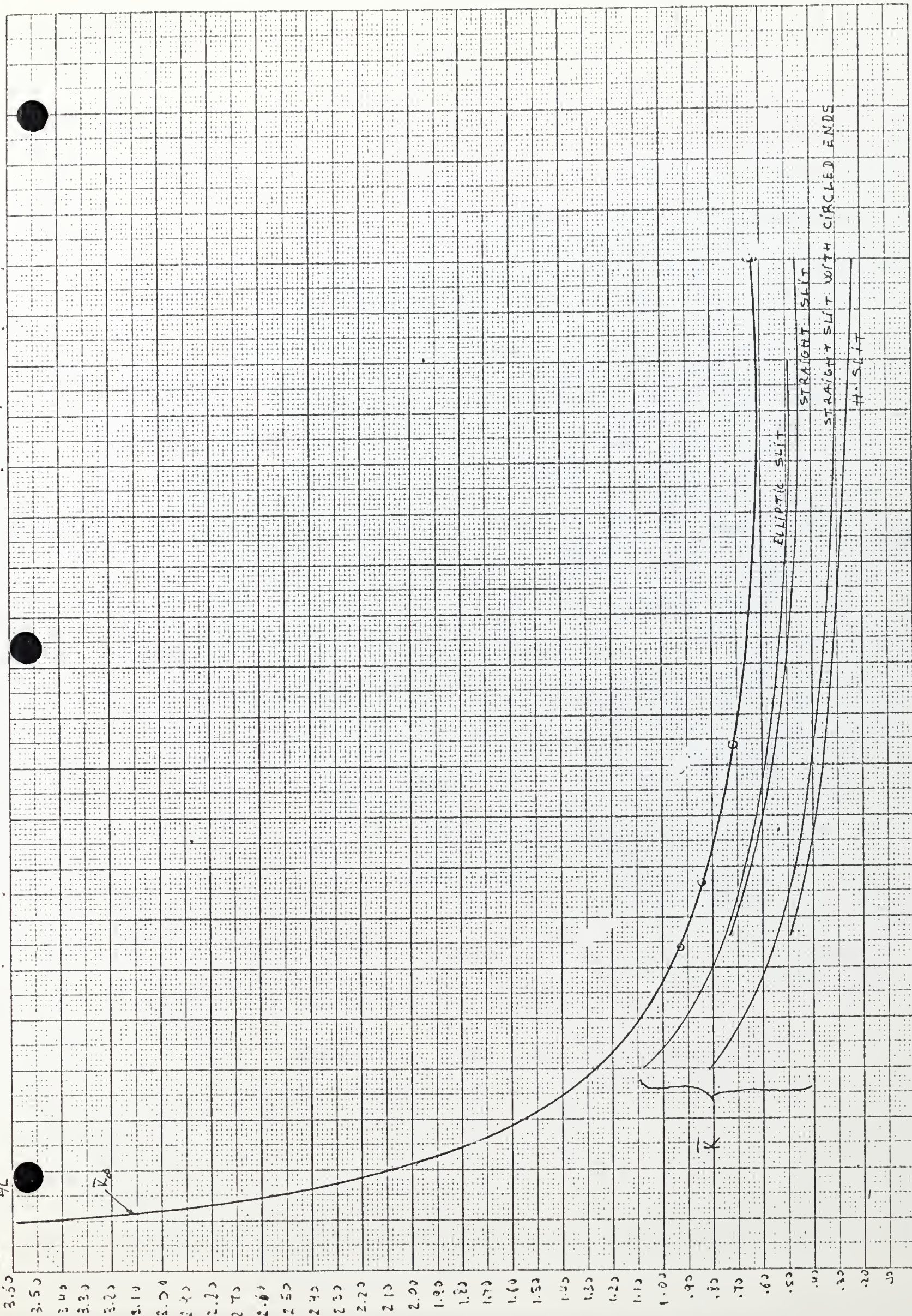
$$\left(\frac{L_o}{L}\right)_{\text{elliptic hole}} = \frac{6}{2} = 3$$

while the same ratio for the straight slit, page 44 is

$$\left(\frac{L_o}{L}\right)_{\text{straight slit}} = \frac{300}{120} \cdot \frac{3}{1.2} < 3$$

Both plates have the same aspect ratio $L_o/W_o = 3/2$. It can therefore be concluded that for straight slit weld configuration, (there is not much difference between an ellipse with an axis ratio of $a/b = 10$ and a straight slit), the value of \bar{K} depends on the ratio between plate length L_o and slit length L . \bar{K} is larger for larger ratio L_o/L and for straight slits having the same length, the degree of constraint K is larger for the one with larger L_o/L . This result conforms to common sense.

$\bar{K} = \frac{K}{E/L}$



Values of \bar{K} versus weld length z/l for various weld forms

In the case of a straight slit with circles at the ends, the diameter of the circle is larger than the slit width, the value of \bar{K} is smaller than that for a straight slit without large-circled ends. And the lowest value of \bar{K} is obtained for an H-slit, where the width of the H-branch is larger than that of the weld slit ($D/W = 10/3 = 3.33$).

All these results seem to conform to common sense and could be considered as an indication of the correctness of the procedure. Theoretically, it cannot be otherwise since it can be proved that, in the finite element method, if the compatibility conditions are satisfied, the results will converge to the true solution as the gridwork becomes finer and finer. In the cases of constant strain element, the compatibility conditions are satisfied.

A full verification of the method is made in the case of the Lehigh specimen (tables 15 and 16). In the case "without sawcut", the results are:

$K_{\text{calculated}} = 48.17 \text{ Kg/mm}^2\text{-mm}$, $K_{\text{measured}} = 44 \text{ Kg/mm}^2\text{-mm}$
and the difference is $\frac{\Delta K}{K} = \frac{4.17}{48.17} = 7.17\%$. In the case "with sawcut", they are:

$K_{\text{calculated}} = 30.69 \text{ Kg/mm}^2\text{-mm}$, $K_{\text{measured}} = 27 \text{ Kg/mm}^2\text{-mm}$
and the difference is $\frac{\Delta K}{K} = \frac{3.69}{30.69} = 12.02\%$.

These values of K have been computed by taking the Young's Modulus $E = 21.1 \times 10^3 \text{ Kg/mm}^2$, which is a little high.

If we take $E = 19.9 \times 10^3 \text{ Kg/mm}^2$, then we will obtain

$$K' = \frac{48.17}{21.1} \times 19.9 = 45.3 \text{ Kg/mm}^2\text{-mm}$$

for the plate without cut and

$$K' = \frac{30.69}{21.1} \times 19.9 = 28.9 \text{ Kg/mm}^2\text{-mm, for the plate with saw cut.}$$

With these values, the differences between the calculated and measured values of K become:

$$\frac{\Delta K_1}{K_1} = \frac{45.3-44}{45.3} = \frac{1.3}{45.3} = 2.87\%$$

and

$$\frac{\Delta K_2}{K_2} = \frac{28.9-27}{28.94} = \frac{1.9}{28.9} = 6.70\%$$

With these differences, the values of K calculated seem to be acceptable if we think of the complicated boundary condition in the case of the plate with sawcut as described on page 60.

B. Significance of the Results

Coming back to Figure 9, it can be seen that the value \bar{K} increases sharply for a value of $x = l/L$ smaller than about 0.30. The degree of constraint K is related to the transverse stress σ_{y_0} by $\sigma_{y_0} = K[\bar{v}]_l$. From the empirical Watanabe-Satoh relation, the transverse shrinkage is related to K by

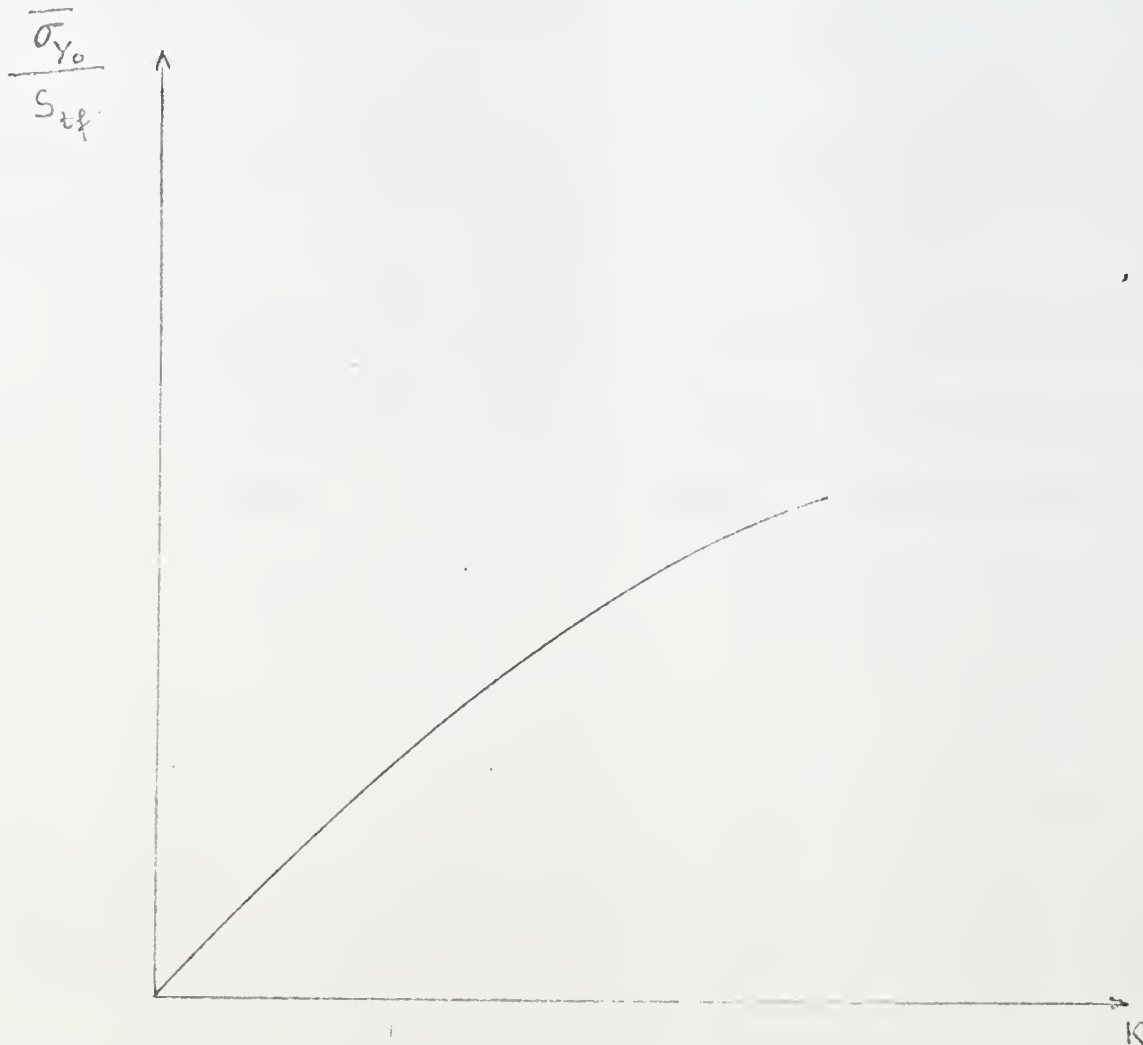
$$S_t = S_{tf} \times \frac{1}{1+0.086 K^{0.87}}$$

Along the weld line $S_t \approx v$ and for a long straight weld, $[\bar{v}]_l \approx v$ since v is almost uniform, except near the ends, then, by substituting the expression of S_t in the relation giving $\bar{\sigma}_{y_0}$, we have:

$$\bar{\sigma}_{y_0} \approx S_{tf} \times \frac{K}{1+0.086 K^{0.87}},$$

where $\bar{\sigma}_{y_0}$ is the average reaction stress along the weld due to constraint.

The value of $\bar{\sigma}_{y_0}/S_{tf}$ as a function of K is plotted below.



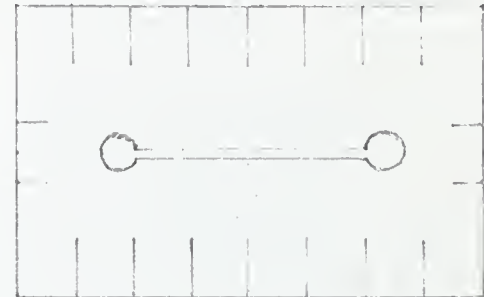
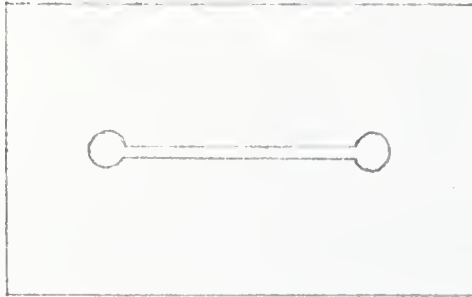
$\overline{\sigma}_{y_0}$ is an increasing function of K , and could be considered as an indication of the residual stress level near the weld.

Therefore, it can be said that if a straight slit in a large plate is to be welded, and if the weld is long enough so that more than one block is necessary, the residual stress would be lower if each weld is made symmetrically and if the ratio of the weld length ℓ to the slit length L is larger than about $1/3$.

Also, the Watanabe-Satoh relation can present a problem of choice: if the transverse shrinkage is to be limited to small values, then high degree of constraint and consequently high level of residual stress will result. On the contrary, if the residual stress is to be small, then low degree of constraint is necessary (if the degree of constraint can be controlled) and high values of transverse shrinkage will result.

On the other hand, welded structures are subjected to cracking. Mechanical factor is one of the main factors that promote cracking. The reason might be attributed to high residual stress associated with high degree of restraint. Therefore, it may be important to determine a critical value of the degree of restraint K_c necessary to produce cracking. Experimentation is necessary and a series of tests, known as the Lehigh test specimen (reference 4, page 32) is proposed

to determine K_c . Basically, it consists of several plates with a straight weld made along a part of its longitudinal median line. If the plate is not cut, a high degree of con-



straint can be achieved and cracking may occur. To decrease the degree of constraint of the weld, several sawcuts are made along the perimeter of the plate, and the degree of constraint decreases as the length of the sawcut increases. Then there should be some value of the sawcut length for which cracking begins to disappear, the corresponding value of the degree of constraint is the critical value K_c which can be considered as a material constraint for a given weld type.

Thus with the value of K_c determined, we can predict whether a weld will crack or not due to its mechanical restraint, since the value of K can be computed for a given weld configuration. One field of application could be in the patch weld, which consists of welding a circular disc



in a flat plate. If the dimension of the hole is such that the disc dimension is small compared to the plate dimension and the weld can be made in one pass, then we have (reference: Mathematical Theory of Elasticity, by Sokolnikoff, Chapter 5):

$$S_R = \frac{2\sigma_R \cdot R}{E} \quad (\text{for an infinite plate})$$

σ_R is the uniform radial stress at the weld,

S_R is the radial shrinkage along the weld and is equal to the sum of the radial displacements of the disc and of the plate at the radial distance, $r = R$.

Then:

$$K = \frac{\sigma_R}{S_R} = \frac{1}{2} \frac{E}{R}$$

In this formula, we find that the degree of constraint in the case of a complete patch weld is inversely proportional to R . Therefore, there should be a critical value R_c of R below which $K > K_c$ and the weld will crack.

However, this value of K :

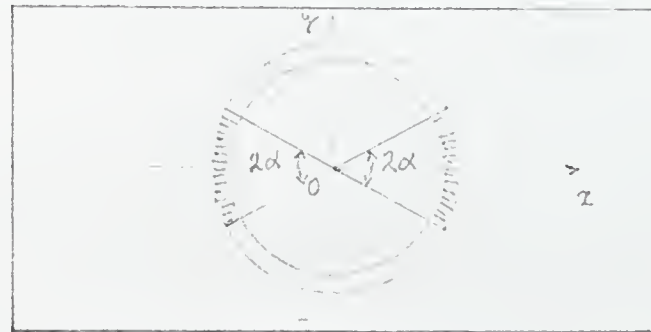
$$K = \frac{E}{2R}$$

is an upper limit, for it is exact only for an infinite plate. For a finite plate, the value of K will be small. The effect of relative dimension could be seen more clearly by examining the expression for the radial stress outside the disc, which is:

$$\sigma_r = \sigma_R \cdot \frac{R^2}{r^2}$$

At infinite, $\sigma_r = 0$. If $R/r = 1/10$, then $\sigma_r/\sigma_R = 1/100$. At a distance equal to 10 times the radius of the disc, the radial stress is one hundredth of the stress at the weld. This value might be still important in some cases.

If the disc is large so that the weld can only be made sector by sector, and if the weld is made symmetrically with respect to the disc center, then with an infinite plate, we



have, for a weld sector of angular value 2α , as in the figure:

$$K(2\alpha) = \frac{\sigma_R}{[\bar{u}_R]_{2\alpha}} = \frac{\Pi E}{2\alpha R} \times \frac{1}{2 - f(2\alpha)}$$

where $f(2\alpha)$ is a convergent series (it converges as $1/n^2$) with $f(\Pi) = f(0) = 0$, $[\bar{u}_R]_{2\alpha}$ is the mean value of the radius displacement taken along the weld angular distance of 2α .

The form of the expression suggests that for $K(2\alpha)$ to be smaller than a critical value K_C :

$$K(2\alpha) < K_C$$

then for a given radius R , there is a value $2\alpha_C$ for which

$$K(2\alpha_C) = K_C$$

and for $\alpha < \alpha_C$, $K > K_C$. Thus, if a large circular disc is to

be welded to a plate and the weld has to be made sector by sector, symmetrical around the origin, then there is a critical value $2\alpha_c$ of the angular weld sector below which the weld might crack and above which the weld would not crack.

III. The Problem Of Experimentation

In the past, experiments have been conducted by actually welding the specimens and measuring the transverse shrinkage and the value of the degree of constraint. Little use has been made of the elastic assumption and of the resulting linear relations between stress and displacement.

One inconvenience of the measurement of the strain due to welding is the high temperature at the weld, and strain gauges had to be put some distance away from the weld. On the other hand, because the weld line is not well defined after the weld is made, the displacements had to be measured also some distance away from the weld. Furthermore, in some cases, weld specimens are difficult to make, as the case of a small slit in a big plate, and consequently expensive.

Taking into account the elastic assumption, it can be noted that for a given average transverse stress, $\bar{\sigma}_{y_0}$, at the weld line, the local displacement and hence the average displacement is inversely proportional to the Young's Modulus E . Therefore, the degree of constraint, defined as:

$$K = \frac{\bar{\sigma}_{y_0}}{[v]_l}$$

is proportional to E, and the ratio of K and E, which has been defined as specific degree of constraint K':

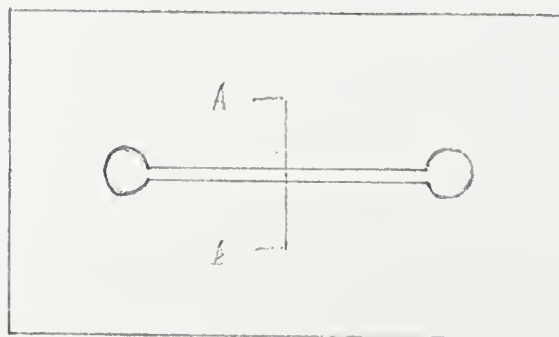
$$K' = \frac{K}{E}$$

is independent of the material, provided that it is linear elastic.

Consequently, there could be a simple method of experimentation in the measurement of the degree of constraint K by having specimens made of material that has a low modulus of elasticity E and by not actually performing the weld but by using some mechanical means to simulate the thermal stress.

One such material could be plastic such as cast phenolic resins for mechanical and chemical purpose whose stress-strain curves are reproduced in Figure 10 (reference: "Technical Data on Plastics," by Manufacturing Chemists' Association, Inc., page 49) and which have a modulus of elasticity in compression of 3×10^5 psi to 5×10^5 psi (ibidem, page 52).

To impose stress in the model, wedges can be driven into the slit. In this case, two similar prismatic wedges with



Sample



Section A-A



Wedges
Cross-section

MECHANICAL AND CHEMICAL PURPOSE

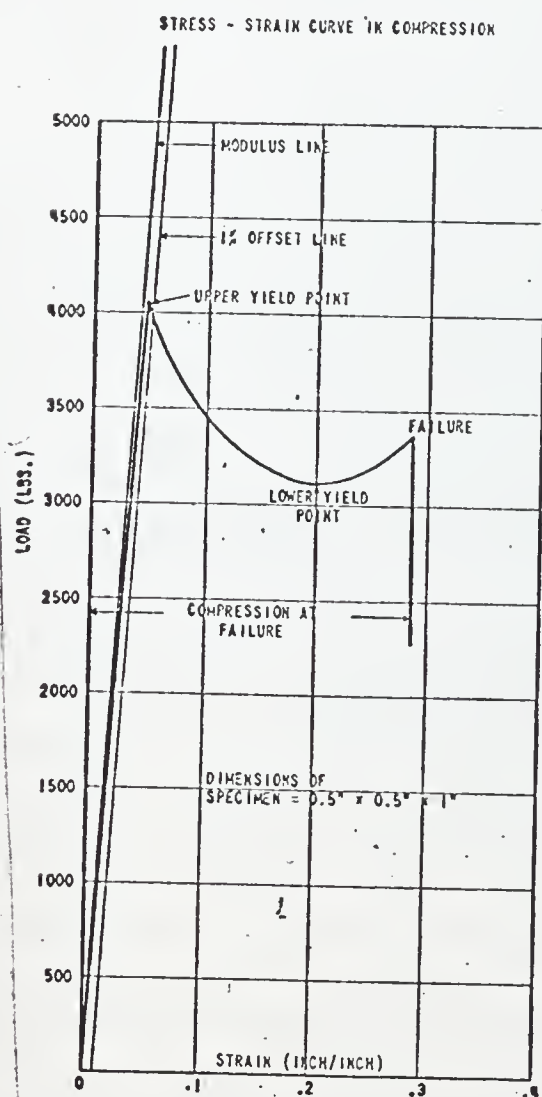
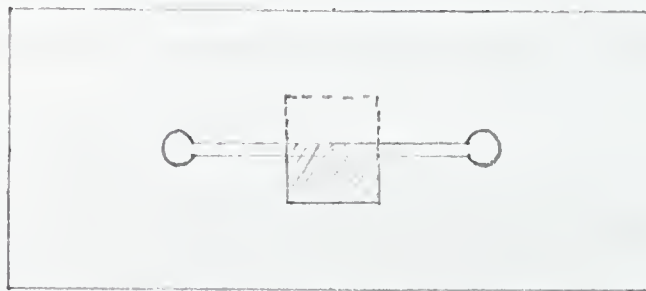


Fig. 10 - Stress - Strain Curve of Plastic .

elongated rectangle triangle cross section made by cutting a prismatic wedge with rectangular cross section along the diagonal plane should be used so that the faces in contact with the slit edges remain parallel. The sample will be in compression to minimize the friction between the active faces of the wedges and the slit edges. Some lubricant, such as Teflon, graphite or oil could be used.



The width of the wedge in contact with the plate represents the weld length ℓ . Several sets of wedges with different widths are necessary to establish a curve giving the specific degree of constraint K' as a function of the ratio R between weld length ℓ and slit length L : $R = \ell/L$ for each weld configuration.

To measure the stress, sensible strain gauges can be used along the edges of the slit on both sides. To measure the transverse displacement along the slit, visible marks are made along the edges of the slit and their displacements can be measured by a microscope, or a comparator. After measurement of local stresses and displacements along the load length ℓ , their averages will be computed and the specific degree of constraint K' obtained by :

$$K' = \frac{1}{E} \frac{[\overline{\sigma}_{y_o}]_{\ell}}{[\overline{v}]_{\ell}}$$

For the verification of the Watanabe-Satoh curve, there is, however, unfortunately no simple way and full-size experiments have to be performed. Given a specimen, we can first compute its degree of constraint and deduce its transverse shrinkage using the Watanabe-Satoh curve. Then actual welding is performed and experimental data obtained are compared with computing results.

If the Watanabe-Satoh relation is correct, then the knowledge of the value of K is most important in the transverse shrinkage control since these laboratory results seem to be applicable to actual structures as has been mentioned in reference 3. In these situations, if the degree of constraint can be computed, then the transverse shrinkage can be determined and hence the level of residual stress is also known which will enable one to predict whether weld cracking due to mechanical constraint could happen and subsequently to take necessary corrective steps if possible.

CONCLUSION

The finite element method, with constant strain elements, seems to give consistent results. A qualitative verification of its validity remains somehow in the fact that the results conform to common sense. Two quantitative verifications have been made and the results can be considered to be acceptable, in the case of the Lehigh specimens.

Taking into account the elastic assumption, and the resulting proportionality between the degree of constraint K and the modulus of elasticity E , a method of experimentation that enables the determination of K experimentally has been proposed.

The determination of the transverse shrinkage due to butt weld of a plate structure can be made, if the degree of constraint is known, by using the Watanabe-Satoh correlation between relative transverse shrinkage S_t/S_{tff} and degree of constraint K .

The Watanabe-Satoh correlation has been obtained empirically through experiments performed in three different specimens: the straight slit, the H-slit and the circular ring. Some further experiments on various slit types would be desirable.

If the numerical method proves to be good and the Watanabe-Satoh correlation to be valid, then shrinkage dis-

tortion control is possible. In this case, there are two alternatives, deduced from the Watanabe-Satoh curve: either to accept a high degree of constraint and hence a high level of residual stress and a low value of transverse shrinkage or a low value of the degree of constraint and hence a low level of residual stress and a high value of transverse shrinkage.

On the other hand, welded structures are subjected to cracking. External constraint could be one major mechanical factor contributing to weld cracking. For each material and weld type, there could be a critical degree of constraint, K_c , above which weld cracking may occur and below which it may not. The Lehigh test specimens are used for this purpose. Once the critical value K_c is determined, it will be possible to know in advance whether a weld is crack-susceptible and therefore to decide on its feasibility or corrections if necessary and possible. One example of application can be found in patch welding.

In both cases, distortion control or weld cracking susceptibility verification, it is essential to compute the value of the degree of constraint K of the weld.

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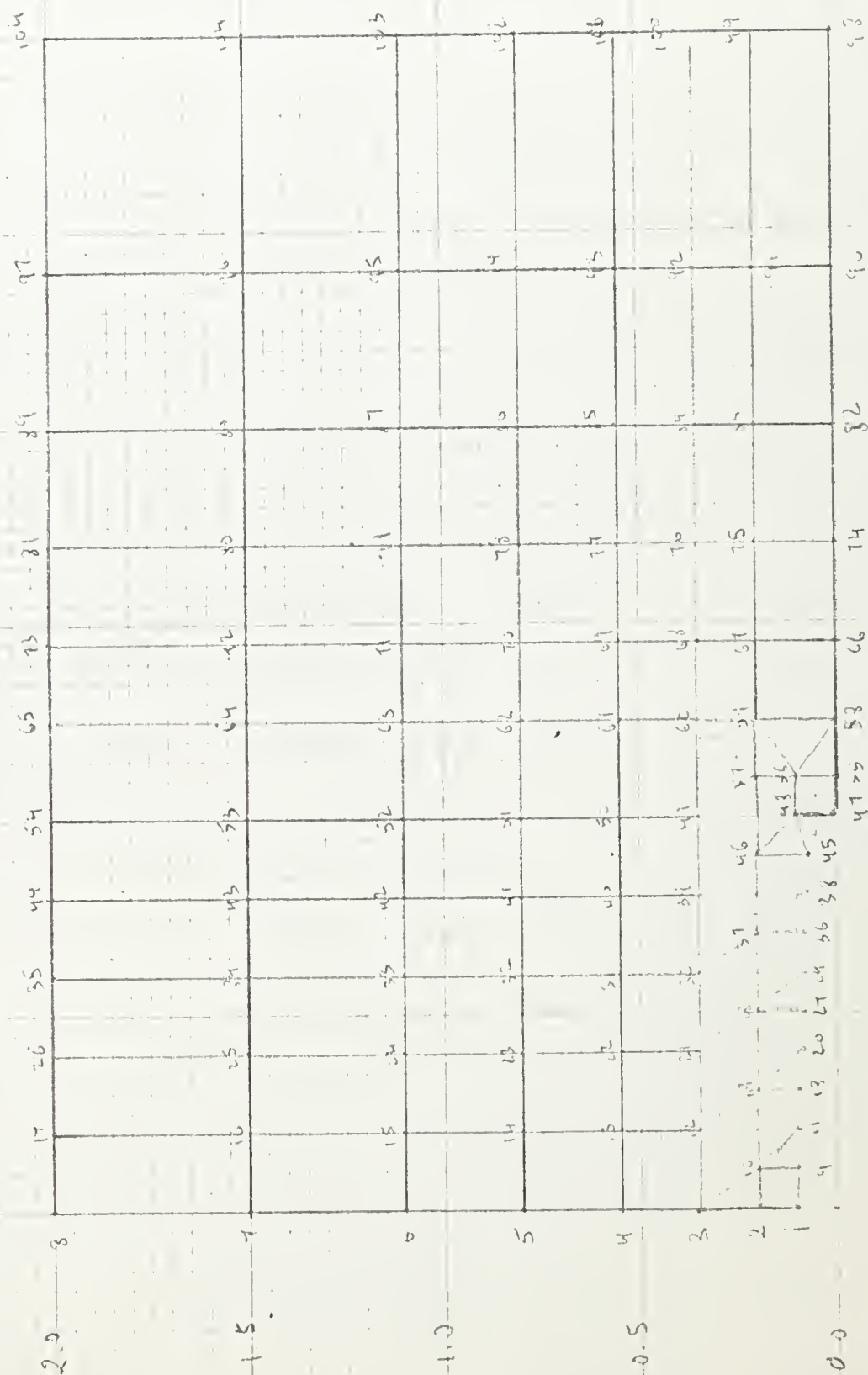
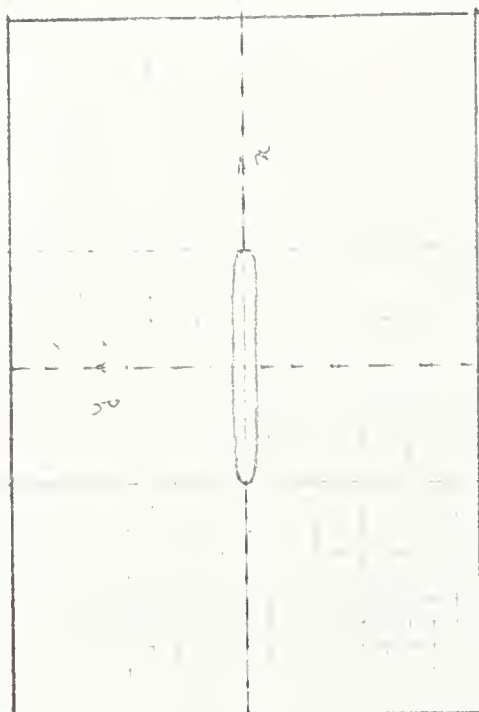
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APPENDIX 1A

Elliptic Slit , 'CSTG' and 'PSR' type

The following presents :

- 1- Plate division , the numbers are the names of the nodes, page 2
- 2- Input data from page 3 to page 12.
- 3- Output data pp 13 -30.



2

APPENDIX 1A ELECTRIC SLIT
ICSTG AND IPSR
TYPE PLANE STRESS
UNITS INCHES
UNITS POUNDS
JOINT COORDINATES

1	.0	.1	5
2	.0	.2	5
3	.0	.35	5
4	.0	.55	5
5	.0	.6	5
6	.0	1.1	5
7	.0	1.5	5
8	.0	2.	5
9	.1	.0006	
10	.1	.2	
11	.2	.000	
12	.2	.25	
13	.2	.55	
14	.2	.8	
15	.2	1.1	
16	.2	1.5	
17	.2	2.	
18	.2	.0055	
19	.2	.2	
20	.4	.0017	
21	.4	.25	

22 .4 .55

23 .4 .8

24 .4 1.1

25 .4 1.5

26 .4 2.

27 .5 .0866

28 .5 .2

29 .6 .08

30 .6 .35

31 .6 .55

32 .6 .8

33 .6 1.1

34 .6 1.5

35 .6 2.

36 .7 .0714

37 .7 .2

38 .8 .06

39 .8 .35

40 .8 .55

41 .8 .8

42 .8 1.1

43 .8 1.5

44 .8 2.

45 .9 .0436

46 .9 .2

47 1. .0 S

48 1. .1

49 1. .35

50 1. .55

51 1. .8

52 1. 1.1

53 1. 1.5

54 1. 2.



20

21



22

23

24



55 1.1 .0 S

56 1.1 .1

57 1.1 .2

58 1.25 .0 S

59 1.25 .2

60 1.25 .35

61 1.25 .55

62 1.25 .8

63 1.25 1.1

64 1.25 1.5

65 1.25 2.

66 1.45 .0 S

67 1.45 .2

68 1.45 .35

69 1.45 .55

70 1.45 .8

71 1.45 1.1

72 1.45 1.5

73 1.45 2.

74 1.7 .0 S

75 1.7 .2

76 1.7 .35

77 1.7 .55

78 1.7 .8

79 1.7 1.1

80 1.7 1.5

81 1.7 2.

82 2. .0 S

83 2. .2

84 2. .35

85 2. .55

86 2. .8

87 2. 1.1

88 2. 1.5

6

89 2. 2.

90 2.4 .0 S

91 2.4 .2

92 2.4 .35

93 2.4 .55

94 2.4 .8

95 2.4 1.1

96 2.4 1.5

97 2.4 2.

98 3. .0 S

99 3. .2

100 3. .35

101 3. .55

102 3. .8

103 3. 1.1

104 3. 1.5

105 3. 2.

ELEMENT INCIDENCES

1 1 10 2

2 1 9 10

3 9 11 10

4 11 19 10

5 11 18 19

6 18 20 19

7 20 28 19

8 20 27 28

9 27 29 28

10 29 37 28

11 29 36 37

12 36 38 37

13 38 46 37

14 38 45 46

4

15 45 48 46

16 45 47 48

17 46 48 57

18 48 56 57

19 48 47 56

20 47 55 56

21 2 10 3

22 10 12 3

23 10 19 12

24 19 21 12

25 19 28 21

26 28 30 21

27 28 37 30

28 37 39 30

29 37 46 39

30 46 49 39

31 46 57 49

32 57 60 49

33 57 59 60

34 57 56 59

35 56 58 59

36 56 55 58

37 3 12 13 4

38 13 12 21 22

39 22 21 30 31

40 31 30 39 40

41 40 39 49 50

42 50 49 60 61

43 61 60 68 69

44 60 59 67 68

45 59 58 66 67

46 5 4 13 14

47 14 13 22 23

48 23 22 31 32

49 32 31 40 41

50 41 40 50 51

51 51 50 61 62

52 62 61 69 70

53 70 69 77 78

54 69 68 76 77

55 68 67 75 76

56 67 66 74 75

57 6 5 14 15

58 15 14 23 24

59 24 23 32 33

60 33 32 41 42

61 42 41 51 52

62 52 51 62 63

63 63 62 70 71

64 71 70 78 79

65 79 78 86 87

66 78 77 85 86

67 77 76 84 85

68 76 75 83 84

69 75 74 82 83

70 7 6 15 16

71 16 15 24 25

72 25 24 33 34

73 34 33 42 43

74 43 42 52 53

75 53 52 63 64

76 64 63 71 72

77 72 71 79 80

78 80 79 87 88

79 88 87 95 96

80 87 86 94 95

81 86 85 93 94

82 85 84 92 93

83 84 83 91 92

84 83 82 90 91

85 8 7 16 17

86 17 16 25 26

87 26 25 34 35

88 35 34 43 44

89 44 43 53 54

90 54 53 64 65

91 65 64 72 73

92 73 72 80 81

93 81 80 88 89

94 89 88 96 97

95 97 96 104 105

96 96 95 103 104

97 95 94 102 103

98 94 93 101 102

99 93 92 100 101

100 92 91 99 100

101 91 90 98 99

ELEMENT PROPERTIES

1 TO 36 TYPE 'CSTG' THICKNESS .2

37 TO 101 TYPE 'PSR' THICKNESS .2

CONSTANTS

E 30000. ALL

PCISSEN .3 ALL

JOINT RELEASES

1 TO 8 FORCE Y

47 55 58 66 74 82 90 98 FORCE X

LOADING 'ONE' 'R=0.1'

JOINT LOADS

1 FORCE Y -10.

LOADING 'TWO' 'R=0.2'

JOINT LOADS

1 FORCE Y -10.

9 FORCE Y -20.

11 FORCE Y -10.

LOADING 'THREE' 'R=0.3'

JOINT LOADS

1 FORCE Y -10.

9 FORCE Y -20.

11 FORCE Y -20.

18 FORCE Y -10.

LOADING 'FOUR' 'R=0.4'

JOINT LOADS

1 FORCE Y -10.

9 FORCE Y -20.

11 FORCE Y -20.

18 FORCE Y -20.

20 FORCE Y -10.

LOADING 'FIVE' 'R=0.5'

JOINT LOADS

1 FORCE Y -10.

9 FORCE Y -20.

11 FORCE Y -20.

18 FORCE Y -20.

20 FORCE Y -20.

27 FORCE Y -10.

LOADING 'SIX' 'R=0.6'

**** INPUT WARNING 7.8 - COMMAND NOT COMPLETELY PROCESSED.

**** SYMBOLS IN COMMAND INPUT NOT YET PROCESSED FOLLOW

****.6'

JOINT LOADS

1 FORCE Y -10.

9 FORCE Y -20.

11 FORCE Y -20.

18 FORCE Y -20.

20 FORCE Y -20.

27 FORCE Y -20.

29 FORCE Y -10.

LOADING 'SEVEN' 'R=C.7'

**** INPUT WARNING 7.8 - COMMAND NOT COMPLETELY PROCESSED.

**** SYMBOLS IN COMMAND INPUT NOT YET PROCESSED FOLLOW

****.7'

JOINT LOADS

1 FORCE Y -10.

9 FORCE Y -20.

11 FORCE Y -20.

18 FORCE Y -20.

20 FORCE Y -20.

27 FORCE Y -20.

29 FORCE Y -20.

36 FORCE Y -10.

LOADING 'EIGHT' 'R=C.8'

JOINT LOADS

1 FORCE Y -10.

9 FORCE Y -20.

11 FORCE Y -20.

18 FORCE Y -20.

20 FORCE Y -20.

27 FORCE Y -20.

29 FORCE Y -20.

36 FORCE Y -20.

38 FORCE Y -10.

LOADING 'NINE' 'R=0.9'

JOINT LOADS

1 FORCE Y -10.

9 FORCE Y -20.

11 FORCE Y -20.

18 FORCE Y -20.

20 FORCE Y -20.

12

27 FORCE Y -20.

29 FORCE Y -20.

36 FORCE Y -20.

38 FORCE Y -20.

45 FORCE Y -10.

STIFFNESS ANALYSIS

LIST DISPLACEMENTS STRESSES ALL

LOADING - ONE

R=C.I

RESULTANT JOINT DISPLACEMENTS - SUPPORTS

JOINT	/-----DISPLACEMENT-----/		
	X DISP.	Y DISP.	Z DISP.
1	0.0	-0.0190214	
2	0.0	-0.0164176	
3	0.0	-0.0141677	
4	0.0	-0.0119233	
5	0.0	-0.0102618	
6	0.0	-0.0090700	
7	0.0	-0.0082253	
8	0.0	-0.0076143	
47	0.0038303	0.0	
55	0.0033430	0.0	
58	0.0030394	0.0	
66	0.0026877	0.0	
74	0.0024385	0.0	
82	0.0022502	0.0	
90	0.0020848	0.0	
98	0.0018459	0.0	

RESULTANT JOINT DISPLACEMENTS - FREE JOINTS

JOINT	/-----DISPLACEMENT-----/		
	X DISP.	Y DISP.	Z DISP.
9	0.0015995	-0.0162619	
10	0.0000280	-0.0151561	
11	0.0021893	-0.0130260	
12	-0.0002631	-0.0123138	
13	-0.0003898	-0.0110877	
14	-0.0003915	-0.0098125	
15	-0.0003477	-0.0087989	
16	-0.0003751	-0.0080443	
17	-0.0007378	-0.0074721	
18	0.0027041	-0.0108832	
19	0.0011566	-0.0108830	
20	0.0029715	-0.0093250	
21	0.0003283	-0.0093653	
22	-0.0004191	-0.0091709	
23	-0.0005996	-0.0086310	
24	-0.0006065	-0.0080450	
25	-0.0007065	-0.0075274	
26	-0.0014134	-0.0070616	
27	0.0031925	-0.0079834	
28	0.0018250	-0.0080113	
29	0.0033595	-0.0067142	
30	0.0007908	-0.0068866	
31	-0.0001465	-0.0070218	
32	-0.0005722	-0.0070738	
33	-0.0007246	-0.0069620	

34	-0.0009623	-0.0067458
35	-0.0013756	-0.0064283
36	0.0035017	-0.0054963
37	-0.0020954	-0.0055502
38	0.0035692	-0.0041175
39	0.0010619	-0.0045350
40	0.0002163	-0.0050158
41	-0.0003609	-0.0054677
42	-0.0007031	-0.0051349
43	-0.0011284	-0.0057979
44	-0.0023928	-0.0056379
45	0.0035948	-0.0026374
46	0.0021234	-0.0029113
48	-0.0029355	-0.0011155
49	0.0014234	-0.0025362
50	-0.0006288	-0.0033290
51	-0.0000539	-0.0040231
52	-0.0005786	-0.0045227
53	-0.0012092	-0.0047855
54	-0.0026559	-0.0047648
56	0.0030173	-0.0004701
57	-0.0024373	-0.0010383
59	0.0025131	-0.0005948
60	0.0019086	-0.0011279
61	0.0011081	-0.0018736
62	-0.0003483	-0.0025982
63	-0.0003568	-0.0031826
64	-0.0012182	-0.0035610
65	-0.0027892	-0.0036554
67	0.0024364	-0.0003642
68	0.0020267	-0.0006984
69	-0.0013818	-0.0011868
70	0.0006187	-0.0017707
71	-0.0001744	-0.0022983
72	-0.0011775	-0.0026771
73	-0.0027728	-0.0028217
75	0.0022961	-0.0002118
76	-0.0020293	-0.0003941
77	0.0015394	-0.0006772
78	-0.0008468	-0.0010477
79	0.0000117	-0.0014291
80	-0.0011003	-0.0017363
81	-0.0026620	-0.0018849
83	-0.0021534	-0.0000873
84	0.0019636	-0.0001628
85	-0.0015846	-0.0002833
86	0.0009781	-0.0004553
87	0.0001551	-0.0006517
88	-0.0010063	-0.0008311
89	-0.0024854	-0.0009465
91	0.0020105	0.0000492
92	-0.0018603	0.0000810
93	0.0015478	0.0001127
94	0.0010127	0.0001336
95	0.0002293	0.0001383
96	-0.0009206	0.0001313
97	-0.0023082	0.0001053
99	-0.0017826	0.0003156
100	0.0016541	0.0005443
101	0.0013824	0.0008237
102	0.0009046	0.0011172
103	-0.0001831	0.0013736
104	-0.0009012	0.0015529
105	-0.0022266	0.0016035

RESULTANT JOINT DISPLACEMENTS - SUPPORTS

JOINT	DISPLACEMENT		
	X DISP.	Y DISP.	Z DISP.
1	0.0	-0.0331751	
2	0.0	-0.0303037	
3	0.0	-0.0212282	
4	0.0	-0.0233361	
5	0.0	-0.0202401	
6	0.0	-0.0179514	
7	0.0	-0.0163048	
8	0.0	-0.0151015	
47	0.0076429	0.0	
55	0.0066645	0.0	
58	0.0060549	0.0	
66	0.0053497	0.0	
74	0.0048511	0.0	
82	0.0044754	0.0	
90	0.0041464	0.0	
98	0.0036717	0.0	

RESULTANT JOINT DISPLACEMENTS - FREE JOINTS

JOINT	DISPLACEMENT		
	X DISP.	Y DISP.	Z DISP.
9	0.0023738	-0.0313961	
10	0.0005612	-0.0293653	
11	0.0038927	-0.0272201	
12	-0.0002953	-0.0242959	
13	-0.0006745	-0.0218518	
14	-0.0007338	-0.0193927	
15	-0.0006745	-0.0174247	
16	-0.0007392	-0.0159489	
17	-0.0014587	-0.0148209	
18	0.0052849	-0.0223224	
19	0.0021572	-0.0223187	
20	0.0059202	-0.0190095	
21	0.0005914	-0.0189392	
22	-0.0007633	-0.0182916	
23	-0.0011457	-0.0171319	
24	-0.0011820	-0.0159560	
25	-0.0013940	-0.0149319	
26	-0.0027953	-0.0140109	
27	0.0063907	-0.0161493	
28	0.0035657	-0.0161888	
29	0.0067207	-0.0135251	
30	0.0015139	-0.0138461	
31	-0.0003100	-0.0140746	
32	-0.0011171	-0.0140949	
33	-0.0014223	-0.0138336	
34	-0.0019016	-0.0133921	
35	-0.0039093	-0.0127605	
36	0.0069991	-0.0110439	
37	0.0041433	-0.0111439	
38	0.0071276	-0.0082565	
39	0.0020769	-0.0090913	

40	0.0003996	-0.0100413
41	-0.0007232	-0.0109140
42	-0.0013899	-0.0114132
43	-0.0022338	-0.0115210
44	-0.0047379	-0.0111987
45	0.0071743	-0.0052840
46	0.0012131	-0.0058298
48	-0.0058480	-0.0022313
49	0.0028116	-0.0050733
50	-0.0012266	-0.0066559
51	-0.0001207	-0.0080310
52	-0.0011512	-0.0090099
53	-0.0023974	-0.0095182
54	-0.0052630	-0.0094712
56	0.0060109	-0.0009383
57	0.0048466	-0.0020741
59	0.0049994	-0.0011862
60	0.0037888	-0.0022509
61	0.0021898	-0.0037407
62	-0.0006800	-0.0051850
63	-0.0007147	-0.0063440
64	-0.0024187	-0.0070502
65	-0.0055325	-0.0072732
67	0.0048467	-0.0007256
68	0.0040274	-0.0013925
69	0.0027397	-0.0023678
70	0.0012211	-0.0035328
71	-0.0003522	-0.0045830
72	-0.0023395	-0.0053343
73	-0.0055039	-0.0056188
75	0.0045667	-0.0004221
76	0.0040341	-0.0007858
77	0.0030571	-0.0013511
78	0.0015783	-0.0020908
79	0.0000192	-0.0028515
80	-0.0021871	-0.0034633
81	-0.0052880	-0.0037674
83	0.0042825	-0.0001745
84	0.0039042	-0.0003254
85	0.0031492	-0.0005654
86	0.0019424	-0.0009104
87	0.0003061	-0.0013032
88	-0.0020006	-0.0016614
89	-0.0049402	-0.0018906
91	0.0039984	0.0000970
92	0.0036955	0.0001596
93	0.0030775	0.0002217
94	0.0020130	0.0002621
95	0.0004553	0.0002700
96	-0.0018304	0.0002543
97	-0.0045899	0.0002027
99	0.0035457	0.0006269
100	0.0032902	0.0010813
101	0.0027497	0.0016361
102	0.0017994	0.0022190
103	0.0003645	0.0027278
104	-0.0017917	0.0030834
105	-0.0044282	0.0031839

LOADING - THREE

R=0.3

RESULTANT JOINT DISPLACEMENTS - SUPPORTS

	X DISP.	Y DISP.	Z DISP.
1	0.0	-0.0449266	
2	0.0	-0.0421501	
3	0.0	-0.0337690	
4	0.0	-0.0339671	
5	0.0	-0.0297454	
6	0.0	-0.0265019	
7	0.0	-0.0241211	
8	0.0	-0.0223572	
47	0.0114066	0.0	
55	0.0099325	0.0	
58	0.0090148	0.0	
66	0.0079556	0.0	
74	0.0072092	0.0	
82	0.0066489	0.0	
90	0.0061599	0.0	
98	0.0054557	0.0	

RESULTANT JOINT DISPLACEMENTS - FREE JOINTS

JOINT	/-----DISPLACEMENT-----/		
	X DISP.	Y DISP.	Z DISP.
9	0.0027857	-0.0435539	
10	0.0011487	-0.0415530	
11	0.0051781	-0.0406956	
12	0.0000403	-0.0356085	
13	-0.0008091	-0.0320611	
14	-0.0010025	-0.0285718	
15	-0.0009681	-0.0257436	
16	-0.0010848	-0.0236007	
17	-0.0021500	-0.0219448	
18	0.0074196	-0.0352692	
19	0.0031079	-0.0342921	
20	0.0085468	-0.0293237	
21	0.0008346	-0.0286890	
22	-0.0009758	-0.0272471	
23	-0.0016060	-0.0253821	
24	-0.0017070	-0.0236211	
25	-0.0020487	-0.0221116	
26	-0.0041219	-0.0207539	
27	0.0094556	-0.0246203	
28	0.0051437	-0.0246683	
29	0.0100069	-0.0205274	
30	0.0021346	-0.0209236	
31	-0.0004742	-0.0211328	
32	-0.0016104	-0.0209929	
33	-0.0020737	-0.0205305	
34	-0.0028005	-0.0198530	
35	-0.0057688	-0.0189143	
36	0.0104426	-0.0166877	
37	0.0060828	-0.0168254	
38	0.0106360	-0.0124407	
39	0.0030049	-0.0136840	
40	0.0005357	-0.0150712	
41	-0.0010793	-0.0163014	
42	-0.0020458	-0.0169758	
43	-0.0032975	-0.0171013	
44	-0.0069980	-0.0166139	
45	0.0107061	-0.0079488	

46	C.0062247	-0.0087642
48	C.0087019	-0.0033492
49	C.0041297	-0.0076119
50	C.0017709	-0.0099737
51	-0.0002054	-0.0120009
52	-C.0017097	-0.0134216
53	-0.0035468	-0.0141470
54	-C.0077819	-0.0140654
56	C.0089471	-0.0014038
57	-0.0071925	-0.0031062
59	C.0074270	-0.0017717
60	C.0056110	-0.0033649
61	C.0032216	-0.0055940
62	C.0009833	-0.0077457
63	-C.0010721	-0.0094598
64	-C.0035858	-C.0105541
65	-C.0081915	-0.0108161
67	C.0072012	-0.0010824
68	C.0059743	-0.0020791
69	C.0040512	-0.0035370
70	C.0017934	-0.0052762
71	-C.0005348	-0.0068379
72	-0.0034719	-0.0079492
73	-C.0081574	-0.0083655
75	C.0067841	-0.0006298
76	C.0059886	-0.0011731
77	C.0045314	-0.0020181
78	C.0024802	-0.0031238
79	C.0000193	-0.0042589
80	-C.0032480	-0.0051689
81	-0.0078457	-0.0056178
83	C.0063614	-0.0002614
84	C.0057977	-0.0004874
85	C.0046735	-0.0008487
86	C.0028787	-0.0013644
87	C.0004491	-0.0019527
88	-0.0029723	-0.0024879
89	-0.0073362	-0.0028280
91	C.0059398	0.0001423
92	C.0054951	0.0002338
93	C.0045702	0.0003240
94	C.0029879	0.0003811
95	C.0006740	0.0003896
96	-0.0027199	0.0003644
97	-C.0068201	0.0002864
99	C.0052685	0.0009299
100	C.0048887	0.0016038
101	C.0040854	0.0024265
102	C.0026732	0.0032904
103	C.0005412	C.0040442
104	-0.0026624	0.0045708
105	-C.0065812	0.0047197

LOADING - FCUR

R=0.4

RESULTANT JOINT DISPLACEMENTS - SUPPORTS

JOINT	/-----DISPLACEMENT-----/		
	X DISP.	Y DISP.	Z DISP.
1	C.0	-0.0549119	
2	0.0	-0.0522321	

3	C.0	-0.0487686
4	C.0	-0.0436227
5	C.0	-0.0385999
6	C.0	-0.0345716
7	C.0	-0.0315470
8	C.0	-0.0292668
47	C.0151024	0.0
55	C.0131227	0.0
58	C.0118919	0.0
66	C.0104764	0.0
74	C.0094846	0.0
82	C.0087438	0.0
90	C.0081002	0.0
98	C.0071761	0.0

RESULTANT JOINT DISPLACEMENTS - FREE JOINTS

JOINT	/-----DISPLACEMENT-----/		
	X DISP.	Y DISP.	Z DISP.
9	C.0030527	-0.0537768	
10	C.0015703	-0.0518083	
11	C.0059167	-0.0515963	
12	C.0006055	-0.0459186	
13	-0.0007890	-0.0415037	
14	-0.0011881	-0.0371770	
15	-0.0012185	-0.0336132	
16	-0.0014042	-0.0308763	
17	-0.0027934	-0.0287321	
18	0.0086725	-0.0476296	
19	0.0042484	-0.0456706	
20	0.0105844	-0.0410436	
21	0.0012460	-0.0382330	
22	-0.0010364	-0.0358376	
23	-0.0019551	-0.0332390	
24	-0.0021650	-0.0309169	
25	-0.0026567	-0.0289547	
26	-0.0053680	-0.0271875	
27	0.0123141	-0.0337411	
28	0.0064128	-0.0337760	
29	C.0131895	-0.0279215	
30	0.0026104	-0.0282361	
31	-0.0005894	-0.0281262	
32	-0.0020292	-0.0276738	
33	-0.0026594	-0.0269558	
34	-0.0036410	-0.0260330	
35	-0.0075195	-0.0247990	
36	C.0138185	-0.0225278	
37	C.0078383	-0.0226840	
38	C.0140799	-0.0167155	
39	0.0037931	-0.0183438	
40	C.0006113	-0.0201101	
41	-0.0014151	-0.0215799	
42	-0.0026552	-0.0223532	
43	-0.0042999	-0.0224621	
44	-0.0091327	-0.0218075	
45	C.0141720	-0.0106501	
46	0.0081103	-0.0117291	
48	C.0114685	-0.0044712	
49	C.0053383	-0.0101563	
50	C.0022358	-0.0132782	
51	-0.0003115	-0.0159084	
52	-0.0022443	-0.0177111	

53	-0.0046380	-0.0186140
54	-0.0101696	-0.0184870
56	0.0117979	-0.0018646
57	-0.0094408	-0.0041330
59	0.0097651	-0.0023477
60	0.0073444	-0.0044647
61	0.0041777	-0.0074258
62	-0.0012457	-0.0102647
63	-0.0014265	-0.0125023
64	-0.0047018	-0.0139147
65	-0.0107237	-0.0142422
67	0.0094708	-0.0014315
68	0.0078396	-0.0027533
69	0.0052923	-0.0046874
70	0.0023213	-0.0069894
71	-0.0007233	-0.0090448
72	-0.0045589	-0.0104965
73	-0.0106933	-0.0110321
75	0.0089207	-0.0008331
76	0.0078667	-0.0015530
77	0.0059401	-0.0026741
78	0.0032377	-0.0041399
79	0.0000086	-0.0056411
80	-0.0042693	-0.0068395
81	-0.0102992	-0.0074242
83	0.0083639	-0.0003475
84	0.0076196	-0.0006483
85	0.0061365	-0.0011293
86	0.0037728	-0.0018156
87	0.0005801	-0.0025976
88	-0.0039091	-0.0033069
89	-0.0096419	-0.0037529
91	0.0078102	0.0001838
92	0.0072244	0.0003015
93	0.0060065	0.0004163
94	0.0039242	0.0004863
95	0.0008817	0.0004919
96	-0.0035782	0.0004538
97	-0.0089710	0.0003502
99	0.0069297	0.0012203
100	0.0064298	0.0021045
101	0.0053728	0.0031835
102	0.0035149	0.0043160
103	0.0007109	0.0053033
104	-0.0035024	0.0059928
105	-0.0085591	0.0061877

LOADING - FIVE

R=0.5

RESULTANT JOINT DISPLACEMENTS - SUPPORTS

JOINT	DISPLACEMENT		
	X DISP.	Y DISP.	Z DISP.
1	0.0	-0.0634834	
2	0.0	-0.0608986	
3	0.0	-0.0574513	
4	0.0	-0.0521739	
5	0.0	-0.0466426	
6	0.0	-0.0420111	
7	0.0	-0.0384484	
8	0.0	-0.0357075	

47	C.0186905	0.0
55	C.0161940	0.0
58	C.0146463	0.0
56	C.0128733	0.0
74	C.0116413	0.0
82	C.0107264	0.0
90	C.0099360	0.0
98	C.0088052	0.0

RESULTANT JOINT DISPLACEMENTS - FREE JOINTS

JOINT	DISPLACEMENT		
	X DISP.	Y DISP.	Z DISP.
9	C.0032263	-0.0625137	
10	C.0018988	-0.0605709	
11	C.0063364	-0.0607102	
12	C.0011590	-0.0548886	
13	-C.0006432	-0.0499927	
14	-C.0012913	-0.0450451	
15	-C.0014197	-0.0408886	
16	-C.0016907	-0.0376449	
17	-C.0033907	-0.0350628	
18	0.0094382	-0.0573005	
19	C.0053064	-0.0553351	
20	C.0121553	-0.0522133	
21	C.0019200	-0.0471901	
22	-C.0009517	-0.0438523	
23	-0.0021834	-0.0405504	
24	-0.0025452	-0.0377114	
25	-0.0032054	-0.0353400	
26	-0.0065086	-0.0331990	
27	C.0146911	-0.0444217	
28	0.0075380	-0.0434262	
29	C.0159895	-0.0359617	
30	0.0029880	-0.0357085	
31	-C.0006206	-0.0349228	
32	-C.0023574	-0.0340186	
33	-C.0031645	-0.0329978	
34	-C.0044062	-0.0318259	
35	-C.0091272	-0.0303134	
36	0.0169973	-0.0286602	
37	C.0093512	-0.0288238	
38	0.0173831	-0.0211529	
39	C.0044095	-0.0230902	
40	0.0006358	-0.0251134	
41	-C.0017162	-0.0266712	
42	-0.0032037	-0.0274588	
43	-C.0052212	-0.0275145	
44	-0.0111010	-0.0266928	
45	C.0175197	-0.0134140	
46	0.0098130	-0.0147484	
48	0.0140983	-0.0056051	
49	C.0063982	-0.0127057	
50	C.0026048	-0.0165502	
51	-C.0004363	-0.0197073	
52	-C.0027437	-0.0218150	
53	-C.0056505	-0.0228483	
54	-C.0123815	-0.0226644	
56	0.0145200	-0.0023198	
57	C.0115464	-0.0051530	
59	0.0119731	-0.0029101	
60	0.0089540	-0.0055428	

61	0.0050332	-0.0092219
62	-0.0014582	-0.0127152
63	-0.0017730	-0.0154310
64	-0.0057470	-0.0171222
65	-0.0130835	-0.0174987
67	0.0116188	-0.0017694
68	0.0095897	-0.0034091
69	0.0064373	-0.0058080
70	0.0027911	-0.0086540
71	-0.0009168	-0.0111761
72	-0.0055823	-0.0129408
73	-0.0130675	-0.0135799
75	0.0109420	-0.0010299
76	0.0096367	-0.0019216
77	0.0072572	-0.0033120
78	0.0039352	-0.0051284
79	-0.0000148	-0.0069822
80	-0.0052346	-0.0084538
81	-0.0126073	-0.0091624
83	0.0102575	-0.0004322
84	0.0093397	-0.0008067
85	0.0075131	-0.0014057
86	0.0046083	-0.0022602
87	0.0006952	-0.0032319
88	-0.0047966	-0.0041100
89	-0.0118202	-0.0046552
91	0.0095794	0.0002204
92	0.0088591	0.0003609
93	0.0073625	0.0004958
94	0.0048058	0.0005739
95	0.0010740	0.0005722
96	-0.0043923	0.0005182
97	-0.0110089	0.0003895
99	0.0085026	0.0014931
100	0.0078889	0.0025747
101	0.0065911	0.0038941
102	0.0043108	0.0052779
103	0.0008702	0.0064831
104	-0.0042991	0.0073241
105	-0.0106300	0.0075618

LOADING - SIX

R

RESULTANT JOINT DISPLACEMENTS - SUPPORTS

JOINT	/-----DISPLACEMENT-----/		
	X DISP.	Y DISP.	Z DISP.
1	0.0	-0.0707884	
2	0.0	-0.0682769	
3	0.0	-0.0648763	
4	0.0	-0.0595567	
5	0.0	-0.0537413	
6	0.0	-0.0486767	
7	0.0	-0.0446858	
8	0.0	-0.0415487	
47	0.0221541	0.0	
55	0.0191168	0.0	
58	0.0172415	0.0	
66	0.0151083	0.0	
74	0.0136403	0.0	
82	0.0125598	0.0	

90

C.0116378

0.0

42

98

C.C103124

0.0

RESULTANT JOINT DISPLACEMENTS - FREE JOINTS

JOINT

/-----DISPLACEMENT-----/

X DISP.

Y DISP.

Z DISP.

9

C.0033847

-0.0699062

10

C.0021443

-0.0679975

11

C.0066860

-0.0682948

12

C.0016194

-0.0624736

13

-C.0004265

-0.0573985

14

-C.0013255

-0.0520324

15

-C.0015720

-0.0474258

16

-C.0019391

-0.0437698

17

-C.0039147

-0.0408084

18

C.0100152

-0.0651887

19

C.0060881

-0.0632396

20

C.0131542

-0.0608400

21

C.0027212

-0.0551791

22

-C.0007476

-0.0510657

23

-C.0023023

-0.0471508

24

-C.0028436

-0.0438639

25

-C.0036841

-0.0411381

26

-C.0075202

-0.0386666

27

C.C161464

-0.0545157

28

C.0087973

-0.0524608

29

C.0181441

-0.0454196

30

C.0034535

-0.0429135

31

-C.0005579

-0.0412906

32

-C.0025841

-0.0398712

33

-C.0035798

-0.0385277

34

-C.0050804

-0.0371136

35

-C.0105584

-0.0353463

36

C.0199076

-0.0353823

37

C.0104816

-0.0355002

38

C.0205088

-0.0259041

39

C.0048148

-C.0279922

40

C.0006563

-0.0299785

41

-C.0019661

-0.0314618

42

-C.0036765

-0.0321847

43

-C.0060421

-0.0321559

44

-C.0128618

-0.0311716

45

C.0207271

-0.0163005

46

C.0112500

-0.0178732

48

C.C165500

-0.0067630

49

C.0072569

-0.0152638

50

C.0028654

-0.0197696

51

-C.0005675

-0.0233299

52

-C.0031944

-0.0256518

53

-C.0065625

-0.0267653

54

-C.0143713

-C.0265145

56

C.0170744

-0.0027654

57

C.0134566

-0.0061624

59

C.0140073

-0.0034514

60

C.0104002

-0.0065837

61

C.0057607

-0.0109637

62

-C.0016142

-0.0150625

63

-C.0021028

-0.0181929

64

-C.0066994

-0.0201149

65

-C.0152218

-0.0205224

67

C.0136056

-0.0020905

68	0.0111881	-0.0040371
69	-0.0074580	-0.0068839
70	0.0031899	-0.0102457
71	-0.0011117	-0.0131956
72	-0.0065209	-0.0152368
73	-0.0152308	-0.0159625
75	0.0128103	-0.0012167
76	0.0112640	-0.0022723
77	0.0084550	-0.0039225
78	0.0045562	-0.0060742
79	-0.0000518	-0.0082605
80	-0.0061246	-0.0099837
81	-0.0147233	-0.0108009
83	0.0120067	-0.0005141
84	0.0109250	-0.0009601
85	0.0087758	-0.0016740
86	0.0053675	-0.0026916
87	0.0007912	-0.0038464
88	-0.0056174	-0.0048848
89	-0.0138275	-0.0055201
91	0.0112139	0.0002513
92	0.0103682	0.0004102
93	0.0086121	0.0005602
94	0.0056152	0.0006409
95	0.0012466	0.0006271
96	-0.0051464	0.0005539
97	-0.0128944	0.0004011
99	0.0099576	0.0017429
100	0.0092382	0.0030051
101	0.0077172	0.0045441
102	0.0050456	0.0061566
103	0.0010162	0.0075594
104	-0.0050369	0.0085373
105	-0.0124557	0.0088137

LOADING - SEVEN

R

RESULTANT JOINT DISPLACEMENTS - SUPPORTS

JOINT	DISPLACEMENT		
	X DISP.	Y DISP.	Z DISP.
1	0.0	-0.0768688	
2	0.0	-0.0744145	
3	0.0	-0.0710667	
4	0.0	-0.0657532	
5	0.0	-0.0597821	
6	0.0	-0.0544265	
7	0.0	-0.0501130	
8	0.0	-0.0466501	
47	0.0254002	0.0	
55	0.0218095	0.0	
58	0.0196082	0.0	
66	0.0171195	0.0	
74	0.0154283	0.0	
82	0.0141551	0.0	
90	0.0131449	0.0	
98	0.0116574	0.0	

RESULTANT JOINT DISPLACEMENTS - FREE JOINTS

JOINT /-----DISPLACEMENT-----/

X DISP. Y DISP. Z DISP.

9	0.0035163	-0.0760364
10	0.0023303	-0.0741603
11	0.0069600	-0.0745232
12	0.0019875	-0.0687629
13	-0.0002103	-0.0636252
14	-0.0013134	-0.0580069
15	-0.0016802	-0.0530797
16	-0.0021455	-0.0491060
17	-0.0043595	-0.0458303
18	0.0104291	-0.0716065
19	0.0066877	-0.0696715
20	0.0137731	-0.0676565
21	0.0034343	-0.0618052
22	-0.0004694	-0.0572469
23	-0.0023375	-0.0528710
24	-0.0030636	-0.0492256
25	-0.0040847	-0.0462083
26	-0.0083811	-0.0434571
27	0.0170658	-0.0618717
28	0.0099243	-0.0597688
29	0.0198071	-0.0542436
30	0.0040941	-0.0494271
31	-0.0004102	-0.0469770
32	-0.0027114	-0.0450522
33	-0.0039027	-0.0433997
34	-0.0056503	-0.0417638
35	-0.0117817	-0.0397726
36	0.0222969	-0.0435322
37	0.0114076	-0.0425285
38	0.0231700	-0.0311901
39	0.0050637	-0.0329095
40	0.0007064	-0.0345297
41	-0.0021525	-0.0358018
42	-0.0040630	-0.0364000
43	-0.0067445	-0.0362665
44	-0.0143752	-0.0351303
45	0.0236327	-0.0193708
46	0.0123673	-0.0211516
48	0.0187212	-0.0079735
49	0.0078871	-0.0178095
50	0.0030308	-0.0228563
51	-0.0006908	-0.0266703
52	-0.0035823	-0.0291140
53	-0.0073520	-0.0302609
54	-0.0160925	-0.0299376
56	0.0193831	-0.0032036
57	0.0151062	-0.0071598
59	0.0158068	-0.0039652
60	0.0116403	-0.0075841
61	0.0063413	-0.0126153
62	0.0017154	-0.0172457
63	-0.0024043	-0.0207122
64	-0.0075347	-0.0228118
65	-0.0170864	-0.0232328
67	0.0153765	-0.0023885
68	0.0125901	-0.0046249
69	0.0083269	-0.0078907
70	0.0035090	-0.0117247
71	-0.0013011	-0.0150494
72	-0.0073506	-0.0173220
73	-0.0171293	-0.0181097

75	0.0144756	-0.0013892
76	0.0127046	-0.0025985
77	0.0095010	-0.0044908
78	0.0050846	-0.0069535
79	-0.0001010	-0.0094419
80	-0.0069165	-0.0113876
81	-0.0165930	-0.0122952
83	0.0135647	-0.0005912
84	0.0123333	-0.0011047
85	0.0093311	-0.0019272
86	0.0060301	-0.0030989
87	0.0008652	-0.0044245
88	-0.0063507	-0.0056099
89	-0.0156131	-0.0063238
91	0.0126701	0.0002755
92	0.0117114	0.0004483
93	0.0097220	0.0006077
94	0.0063306	0.0006857
95	0.0013945	0.0006554
96	-0.0058215	0.0005605
97	-0.0145783	0.0003854
99	0.0112559	0.0019631
100	0.0104417	0.0033845
101	0.0087209	0.0051166
102	0.0056993	0.0069294
103	0.0011442	0.0085042
104	-0.0056972	0.0096009
105	-0.0140889	0.0099108

LOADING - EIGHT

R=0.8

RESULTANT JOINT DISPLACEMENTS - SUPPORTS

JOINT	/-----DISPLACEMENT-----/		
	X DISP.	Y DISP.	Z DISP.
1	0.0	-0.0816633	
2	0.0	-0.0792502	
3	0.0	-0.0759463	
4	0.0	-0.0706540	
5	0.0	-0.0646051	
6	0.0	-0.0590722	
7	0.0	-0.0545346	
8	0.0	-0.0508220	
47	0.0283854	0.0	
55	0.0242054	0.0	
58	0.0216707	0.0	
66	0.0188303	0.0	
74	0.0169330	0.0	
82	0.0155654	0.0	
90	0.0144105	0.0	
98	0.0127843	0.0	

RESULTANT JOINT DISPLACEMENTS - FREE JOINTS

JOINT	/-----DISPLACEMENT-----/		
	X DISP.	Y DISP.	Z DISP.
9	0.0036272	-0.0808557	

10	0.0024668	-0.0790097
11	0.0071870	-0.0793905
12	0.0022564	-0.0736959
13	-0.0000309	-0.0685421
14	-0.0012767	-0.0627940
15	-0.0017502	-0.0576588
16	-0.0023056	-0.0524593
17	-0.0047118	-0.0499408
18	0.0107701	-0.0765671
19	0.0071199	-0.0746531
20	0.0142572	-0.0728108
21	0.0039764	-0.0669124
22	-0.0001811	-0.0621822
23	-0.0023177	-0.0575045
24	-0.0032121	-0.0535986
25	-0.0043977	-0.0503604
26	-0.0090650	-0.0473883
27	0.0177371	-0.0672871
28	0.0107133	-0.0651865
29	0.0203485	-0.0603015
30	0.0047820	-0.0547995
31	-0.0002097	-0.0516802
32	-0.0027585	-0.0493286
33	-0.0041331	-0.0474153
34	-0.0061001	-0.0455945
35	-0.0127582	-0.0434199
36	0.0236985	-0.0509101
37	0.0124181	-0.0487284
38	0.0250820	-0.0377371
39	0.0053241	-0.0373361
40	0.0007911	-0.0384618
41	-0.0022679	-0.0394712
42	-0.0043543	-0.0399194
43	-0.0073055	-0.0396778
44	-0.0155904	-0.0384098
45	0.0261252	-0.0228341
46	0.0130166	-0.0247029
48	0.0204962	-0.0092833
49	0.0082490	-0.0203232
50	0.0031437	-0.0256453
51	-0.0007901	-0.0295579
52	-0.0038909	-0.0320426
53	-0.0079906	-0.0331861
54	-0.0174839	-0.0327916
56	0.0213593	-0.0036277
57	0.0163955	-0.0081380
59	0.0172888	-0.0044316
60	0.0126139	-0.0084917
61	0.0067528	-0.0141193
62	0.0017710	-0.0191626
63	-0.0026604	-0.0228724
64	-0.0082198	-0.0250934
65	-0.0186072	-0.0255132
67	0.0168586	-0.0026493
68	0.0137358	-0.0051492
69	0.0090080	-0.0087868
70	0.0037402	-0.0130267
71	-0.0014725	-0.0166523
72	-0.0080375	-0.0191021
73	-0.0186887	-0.0199326
75	0.0158702	-0.0015396
76	0.0138992	-0.0028839
77	0.0103524	-0.0049923
78	0.0055004	-0.0077270
79	-0.0001577	-0.0104726
80	-0.0075774	-0.0126005

81	-C.0181411	-0.0135767
83	C.0143677	-0.0006595
84	C.0135068	-0.0012335
85	C.0108130	-0.0021535
86	C.0065695	-0.0034627
87	C.0009152	-0.0049386
88	-C.0069660	-0.0062504
89	-C.0171020	-0.0070278
91	C.0138879	0.0002925
92	C.0128333	0.0004743
93	C.0106462	0.0006379
94	C.0069226	0.0007084
95	C.0015116	0.0006587
96	-C.0063894	0.0005411
97	-C.0159903	0.0003465
99	C.0123434	0.0021452
100	C.0114494	0.0036979
101	C.0095603	0.0055888
102	C.0062445	0.0075656
103	0.0012487	0.0092802
104	-C.0062526	0.0104727
105	-C.0154610	0.0108096

LOADING - NINE

R=0.9

RESULTANT JOINT DISPLACEMENTS - SUPPORTS

JOINT	/-----DISPLACEMENT-----/		
	X DISP.	Y DISP.	Z DISP.
1	0.0	-0.0850353	
2	0.0	-0.0826494	
3	0.0	-0.0793785	
4	0.0	-0.0741104	
5	0.0	-0.0680318	
6	0.0	-0.0624048	
7	0.0	-0.0577312	
8	0.0	-0.0538499	
47	0.0310150	0.0	
55	C.0261656	0.0	
58	C.0232868	0.0	
66	C.0201329	0.0	
74	0.0180622	0.0	
82	C.0165881	0.0	
90	0.0153533	0.0	
98	0.0136250	0.0	

RESULTANT JOINT DISPLACEMENTS - FREE JOINTS

JOINT	/-----DISPLACEMENT-----/		
	X DISP.	Y DISP.	Z DISP.
9	0.0037056	-0.0842386	
10	C.0025569	-0.0824148	
11	0.0073451	-0.0827932	
12	0.0024349	-0.0771531	
13	0.0000938	-0.0720068	
14	-0.0012374	-0.0662013	
15	-0.0017892	-0.0609505	

16	-0.0024153	-0.0566108
17	-0.0049584	-0.0529270
18	0.0110033	-0.0800133
19	0.0074025	-0.0781165
20	0.0145717	-0.0763407
21	0.0043446	-0.0704582
22	0.0000462	-0.0656680
23	-0.0022736	-0.0608285
24	-0.0032987	-0.0567615
25	-0.0046138	-0.0533780
26	-0.0095452	-0.0502520
27	0.0181342	-0.0709586
28	0.0112331	-0.0688602
29	0.0213822	-0.0642677
30	0.0053093	-0.0585609
31	-0.0000037	-0.0550807
32	-0.0027529	-0.0524460
33	-0.0042749	-0.0503506
34	-0.0064137	-0.0483954
35	-0.0134472	-0.0460885
36	0.0244242	-0.0553001
37	0.0132286	-0.0529918
38	0.0263409	-0.0433576
39	0.0056585	-0.0407727
40	0.0008980	-0.0414421
41	-0.0023152	-0.0422127
42	-0.0045449	-0.0425252
43	-0.0077013	-0.0421916
44	-0.0164535	-0.0408234
45	0.0277842	-0.0275261
46	0.0134052	-0.0281706
48	0.0215533	-0.0107645
49	0.0084032	-0.0225592
50	0.0032325	-0.0278836
51	-0.0008527	-0.0317737
52	-0.0041043	-0.0342425
53	-0.0084470	-0.0353613
54	-0.0184795	-0.0349064
56	0.0228167	-0.0040188
57	0.0172394	-0.0090751
59	0.0183554	-0.0048399
60	0.0132718	-0.0092629
61	0.0070007	-0.0153582
62	0.0017949	-0.0206664
63	-0.0028508	-0.0245219
64	-0.0087171	-0.0268109
65	-0.0197060	-0.0272200
67	0.0179600	-0.0028576
68	0.0145584	-0.0055768
69	0.0094734	-0.0095098
70	0.0038843	-0.0140553
71	-0.0016084	-0.0178894
72	-0.0085414	-0.0204559
73	-0.0158243	-0.0213090
75	0.0169097	-0.0016576
76	0.0147781	-0.0031096
77	0.0109639	-0.0053913
78	0.0057875	-0.0083384
79	-0.0002122	-0.0112770
80	-0.0080669	-0.0135355
81	-0.0192784	-0.0145572
83	0.0158378	-0.0007140
84	0.0143763	-0.0013366
85	0.0114894	-0.0023351
86	0.0069578	-0.0037546
87	0.0009423	-0.0053433

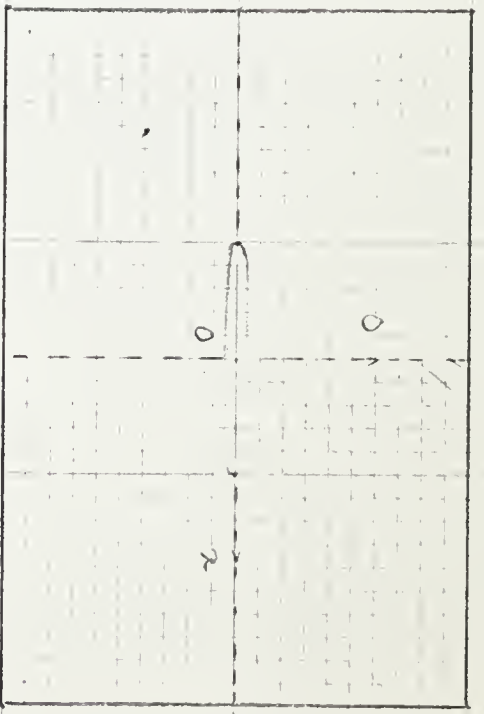
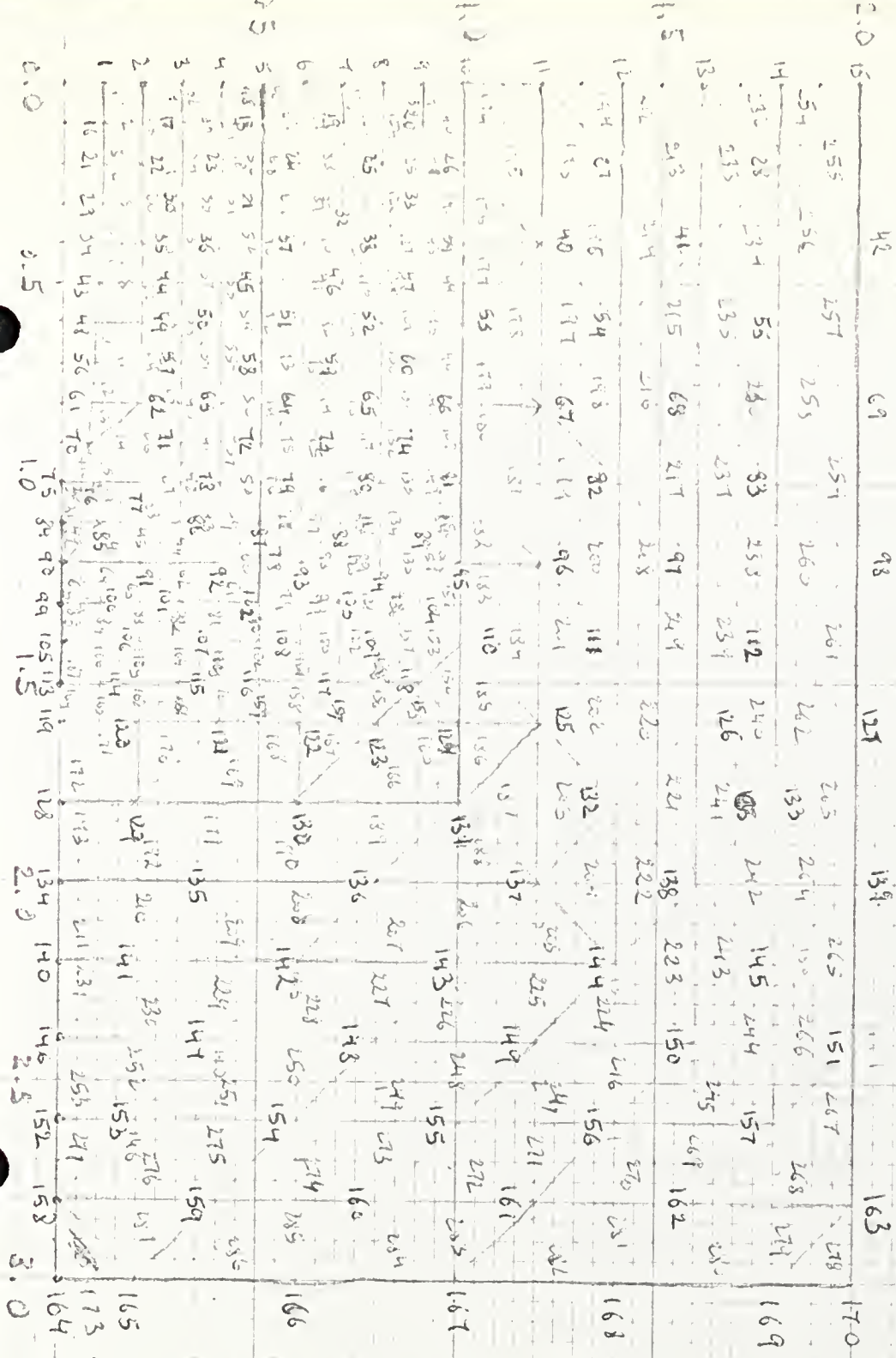
88	-0.0074249	-0.0067563
89	-0.0182050	-0.0075737
91	0.0147945	0.0003024
92	0.0136670	0.0004886
93	0.0113305	0.0006517
94	0.0073575	0.0007120
95	0.0015932	0.0006430
96	-0.0068145	0.0005046
97	-0.0170429	0.0002950
99	0.0131544	0.0022737
100	0.0122005	0.0039276
101	0.0101851	0.0059344
102	0.0066492	0.0080300
103	0.0013244	0.0093448
104	-0.0066681	0.0111053
105	-0.0164863	0.0114613

APPENDIX 1B

Elliptic slit , 'CSTG' , fine gridwork .

The following presents :

- 1- Plate division, the numbers are node names , page 32.
- 2- Input data , pp 33 - 48 .
- 3- Output data , pp 49 - 75 .



APPENDIX 10 ELLIPTIC SLIT
 TESTED FINEST GRIDWORK
 TYPE PLANE STRESS
 UNITS INCHES
 UNITS POUNDS
 JOINT COORDINATES

1	0.0	0.1	c
2	0.0	0.2	c
3	0.0	0.3	c
4	0.0	0.4	c
5	0.0	0.5	c
6	0.0	0.6	c
7	0.0	0.7	c
8	0.0	0.8	c
9	0.0	0.9	c
10	0.0	1.0	c
11	0.0	1.2	c
12	0.0	1.4	c
13	0.0	1.6	c
14	0.0	1.8	c
15	0.0	2.0	c
16	0.1	0.0006	
17	0.1	0.2	
18	0.1	0.5	
19	0.1	0.7	
20	0.1	0.9	
21	0.2	0.0000	

22 0.2 0.2

23 0.2 0.4

24 0.2 0.6

25 0.2 0.8

26 0.2 1.0

27 0.2 1.4

28 0.2 1.8

29 0.3 0.0955

30 0.3 0.3

31 0.3 0.5

32 0.3 0.7

33 0.3 0.9

34 0.4 0.0917

35 0.4 0.2

36 0.4 0.4

37 0.4 0.6

38 0.4 0.8

39 0.4 1.0

40 0.4 1.2

41 0.4 1.6

42 0.4 2.0

43 0.5 0.0866

44 0.5 0.3

45 0.5 0.5

46 0.5 0.7

47 0.5 0.9

48 0.6 0.0800

49 0.6 0.2

50 0.6 0.4

51 0.6 0.6

52 0.6 0.8

53 0.6 1.0

54 0.6 1.4

55 C.6 1.8

56 C.7 0.0714

57 C.7 C.3

58 C.7 C.5

59 0.7 0.7

60 C.7 C.9

61 0.8 C.0600

62 C.8 0.2

63 C.8 C.4

64 C.8 0.6

65 C.8 C.8

66 C.8 1.0

67 0.8 1.2

68 0.8 1.6

69 0.8 2.0

70 0.9 0.0436

71 C.9 C.3

72 0.9 0.5

73 C.9 C.7

74 C.9 C.9

75 1.0 0.0 S

76 1.0 C.1

77 1.0 0.2

78 1.0 C.4

79 1.0 C.6

80 1.0 0.8

81 1.0 1.0

82 1.0 1.4

83 1.0 1.8

84 1.1 C.0 S

85 1.1 C.1

86 1.1 C.3

87 1.1 0.5

88 1.1 0.7

89 1.1 C.9

90 1.2 0.0 S

91 1.2 C.2

92 1.2 C.4

93 1.2 0.6

94 1.2 C.8

95 1.2 1.0

96 1.2 1.2

97 1.2 1.6

98 1.2 2.0

99 1.3 C.0 S

100 1.3 0.1

101 1.3 C.3

102 1.3 C.5

103 1.3 0.7

104 1.3 C.9

105 1.4 0.0 S

106 1.4 0.2

107 1.4 C.4

108 1.4 0.6

109 1.4 C.8

110 1.4 1.0

111 1.4 1.4

112 1.4 1.8

113 1.5 C.0 S

114 1.5 0.1

115 1.5 C.3

116 1.5 C.5

117 1.5 0.7

118 1.5 C.9

119 1.6 0.0 S

120 1.6 C.2

121 1.6 0.4

122 1.6 0.6

123 1.6 0.8

124 1.6 1.0

125 1.6 1.2

126 1.6 1.6

127 1.6 2.0

128 1.8 0.0 S

129 1.8 0.2

130 1.8 0.6

131 1.8 1.0

132 1.8 1.4

133 1.8 1.8

134 2.0 0.0 S

135 2.0 0.4

136 2.0 0.8

137 2.0 1.2

138 2.0 1.6

139 2.0 2.0

140 2.2 0.0 S

141 2.2 0.2

142 2.2 0.6

143 2.2 1.0

144 2.2 1.4

145 2.2 1.8

146 2.4 0.0 S

147 2.4 0.4

148 2.4 0.8

149 2.4 1.2

150 2.4 1.6

151 2.4 2.0

152 2.6 0.0 S

153 2.6 0.2

154 2.6 C.6

38

155 2.6 1.0

156 2.6 1.4

157 2.6 1.8

158 2.8 C.C S

159 2.8 0.4

160 2.8 C.8

161 2.8 1.2

162 2.8 1.6

163 2.8 2.0

164 3.0 0.0 S

165 3.0 0.2

166 3.0 C.6

167 3.0 1.0

168 3.0 1.4

169 3.0 1.8

170 3.0 2.0

ELEMENT INCIDENCES

1 1 16 2

2 16 22 2

3 16 21 22

4 22 21 29

5 22 29 35

6 29 34 35

7 35 34 43

8 35 43 49

9 43 48 49

10 49 48 56

11 49 56 62

12 56 61 62

13 62 61 70

14 62 70 77

15 70 76 77

16 70 75 76

17 3 2 17

18 2 22 17

19 17 22 30

20 22 35 30

21 30 35 44

22 35 49 44

23 44 49 57

24 49 62 57

25 57 62 71

26 62 77 71

27 71 77 86

28 77 85 86

29 77 76 85

30 76 75 85

31 75 84 85

32 4 3 17

33 4 17 23

34 17 30 23

35 22 30 36

36 30 44 36

37 36 44 50

38 44 57 50

39 50 57 63

40 57 71 63

41 63 71 78

42 71 86 78

43 78 86 92

44 86 91 92

45 86 85 91

46 85 90 91

47 85 84 90

48 5 4 18

49 4 23 18

50 18 22 31

51 22 36 31

52 31 36 45

53 36 50 45

54 45 50 58

55 50 63 58

56 58 63 72

57 63 78 72

58 72 78 87

59 78 92 87

60 87 92 102

61 92 101 102

62 92 91 101

63 91 100 101

64 91 90 100

65 90 99 100

66 6 5 18

67 6 18 24

68 18 31 24

69 24 31 37

70 31 45 37

71 37 45 51

72 45 58 51

73 51 58 64

74 58 72 64

75 64 72 79

76 72 87 79

77 79 87 93

78 93 87 102

79 93 102 108

80 102 107 108

81 102 101 107

82 101 106 107

83 101 100 106

84 100 105 106

85 100 59 105

86 7 6 19

87 6 24 19

88 19 24 32

89 24 37 32

90 32 37 46

91 37 51 46

92 46 51 59

93 51 64 59

94 59 64 73

95 64 79 73

96 73 79 88

97 79 93 88

98 88 93 103

99 93 108 103

100 103 108 117

101 108 116 117

102 108 107 116

103 107 116 116

104 107 106 115

105 106 114 115

106 106 105 114

107 105 113 114

108 8 7 19

109 8 19 25

110 19 32 25

111 25 32 38

112 32 46 38

113 38 46 52

114 46 59 52

115 52 59 65

116 59 73 65

117 65 73 80

118 73 88 80

119 80 88 94

120 94 88 103

121 94 103 109

122 109 103 117

123 9 8 20

124 8 25 20

125 20 25 33

126 25 28 33

127 33 38 47

128 38 52 47

129 47 52 60

130 52 65 60

131 60 65 74

132 65 80 74

133 74 80 89

134 80 94 89

135 89 94 104

136 94 109 104

137 104 109 118

138 109 117 118

139 10 9 20

140 10 20 26

141 20 33 26

142 26 33 39

143 33 47 39

144 39 47 53

145 47 60 53

146 53 60 66

147 60 74 66

148 66 74 81

149 74 89 81

150 81 89 95

151 95 89 104

152 95 104 110

153 104 118 110

154 110 118 124

155 118 123 124

156 118 117 123

157 117 122 123

158 117 116 122

159 116 121 122

160 116 115 121

161 115 120 121

162 115 114 120

163 114 119 120

164 114 113 119

165 124 123 131

166 123 130 131

167 123 122 130

168 122 121 130

169 121 129 130

170 121 120 129

171 120 119 129

172 119 128 129

174 11 10 26

175 11 26 40

176 26 39 40

177 40 39 53

178 40 53 67

179 53 66 67

180 67 66 81

181 67 81 96

182 81 95 96

183 96 95 110

184 96 110 125

185 110 124 125

186 125 124 131

187 125 131 137

188 131 136 137

189 131 136 136

190 130 135 136

191 130 129 135

192 129 134 135

193 129 128 134

194 12 11 27

195 11 40 27

196 27 40 54

197 40 67 54

198 54 67 82

199 67 96 82

200 82 96 111

201 96 125 111

202 111 125 132

203 125 137 132

204 132 137 144

205 137 143 144

206 137 136 143

207 136 142 143

208 136 135 142

209 135 141 142

210 135 134 141

211 134 140 141

212 13 12 27

213 13 27 41

214 27 54 41

215 41 54 68

216 54 82 68

217 68 82 97

218 97 82 111

219 97 111 126

220 111 132 126

221 126 132 138

222 132 144 138

223 138 144 150

224 144 149 150

225 144 143 149

226 143 148 149

227 143 142 148

228 142 147 148

229 142 141 147

230 141 146 147

231 141 140 146

232 14 13 28

233 13 41 28

234 28 41 55

235 41 68 55

236 55 68 83

237 68 97 83

238 83 97 112

239 97 126 112

240 112 126 133

241 126 128 133

242 133 138 145

243 138 150 145

244 145 150 157

245 150 156 157

246 150 149 156

247 149 155 156

248 149 148 155

46

249 148 154 155

250 148 147 154

251 147 153 154

252 147 146 153

253 146 152 153

254 15 14 28

255 15 28 42

256 28 55 42

257 42 55 69

258 55 83 69

259 69 83 98

260 98 83 112

261 98 112 127

262 112 133 127

263 127 133 139

264 133 145 139

265 139 145 151

266 145 157 151

267 151 157 163

268 157 162 163

269 157 156 162

270 156 161 162

271 156 155 161

272 155 160 161

273 155 154 160

274 154 159 160

275 154 153 159

276 153 158 159

277 153 152 158

278 163 169 170

279 162 162 169

280 162 168 169

47

281 162 161 168

47

282 161 167 168

283 161 166 167

284 160 166 167

285 160 159 166

286 159 165 166

287 159 158 165

173 158 164 165

ELEMENT PROPERTIES

1 TO 287 TYPE 'CSTG' THICKNESS 0.20

CONSTANTS

E 30000. ALL

POISSON .3 ALL

JOINT RELEASES

1 TO 15 FORCE Y

75 84 90 99 105 113 119 128 134 140 146 152 158 164 FORCE X

LOADING 'ONE' 'X=0.10'

JOINT LOADS

1 16 FORCE Y -10.

LOADING 'TWO' 'X=0.20'

JOINT LOADS

1 21 FORCE Y -10.

16 FORCE Y -20.

LOADING 'THREE' 'X=0.30'

JOINT LOADS

1 29 FORCE Y -10.

16 21 FORCE Y -20.

LOADING 'FOUR' 'X=0.40'

JOINT LOADS

1 34 FORCE Y -10.

16 21 29 FORCE Y -20.

LOADING 'FIVE' 'X=0.50'

JOINT LOADS

67

1 43 FORCE Y -10.

48

16 21 29 34 FORCE Y -20.

LOADING 'SIX' 'X=0.60'

JOINT LOADS

1 48 FORCE Y -10.

16 21 29 34 43 FORCE Y -20.

LOADING 'SEVEN' 'X=0.70'

JOINT LOADS

1 56 FORCE Y -10.

16 21 29 34 43 48 FORCE Y -20.

LOADING 'EIGHT' 'X=0.80'

JOINT LOADS

1 61 FORCE Y -10.

16 21 29 34 43 48 56 FORCE Y -20.

LOADING 'NINE' 'X=0.90'

JOINT LOADS

1 70 FORCE Y -10.

16 21 29 34 43 48 56 61 FORCE Y -20.

STIFFNESS ANALYSIS

LIST DISPLACEMENTS STRESSES ALL

LOADING - CNE

X=0.10

RESULTANT JOINT DISPLACEMENTS - SUPPORTS

JOINT	/-----DISPLACEMENT-----/		
	X DISP.	Y DISP.	Z DISP.
1	0.0	-0.0185230	
2	0.0	-0.0166612	
3	0.0	-0.0146869	
4	0.0	-0.0133945	
5	0.0	-0.0122791	
6	0.0	-0.0114776	
7	0.0	-0.0107484	
9	0.0	-0.0097098	
8	0.0	-0.0102054	
10	0.0	-0.0093475	
11	0.0	-0.0088387	
12	0.0	-0.0083743	
13	0.0	-0.0081298	
14	0.0	-0.0078257	
15	0.0	-0.0076729	
75	0.0037623	0.0	
84	0.0033174	0.0	
90	0.0031152	0.0	
99	0.0028728	0.0	
105	0.0027397	0.0	
113	0.0025931	0.0	
119	0.0025091	0.0	
128	0.0023517	0.0	
134	0.0022897	0.0	
140	0.0021620	0.0	
146	0.0021160	0.0	
152	0.0020134	0.0	
158	0.0019756	0.0	
164	0.0018512	0.0	

RESULTANT JOINT DISPLACEMENTS - FREE JOINTS

JOINT	/-----DISPLACEMENT-----/		
	X DISP.	Y DISP.	Z DISP.
16	0.0012313	-0.0162476	
17	-0.0002362	-0.0137128	
18	-0.0002592	-0.0118305	
19	-0.0002330	-0.0104825	
20	-0.0001980	-0.0095192	
21	0.0023128	-0.0128208	
22	0.0005709	-0.0127746	
23	-0.0003089	-0.0117733	
24	-0.0004105	-0.0105745	
25	-0.0003942	-0.0096140	
26	-0.0003544	-0.0088817	
27	-0.0003685	-0.0080599	

28	-0.0005453	-0.0076096
29	0.0027077	-0.0108633
30	0.0002573	-0.0108334
31	-0.0004012	-0.0102383
32	-0.0005243	-0.0094680
33	-0.0005148	-0.0088064
34	0.0029916	-0.0092648
35	0.0015571	-0.0092760
36	0.0000274	-0.0093159
37	-0.0004849	-0.0089627
38	-0.0006017	-0.0084946
39	-0.0005812	-0.0080864
40	-0.0006377	-0.0077892
41	-0.0008025	-0.0073069
42	-0.0014450	-0.0069690
43	0.0031787	-0.0079023
44	0.0009117	-0.0080075
45	-0.0001585	-0.0080513
46	-0.0005451	-0.0078908
47	-0.0006454	-0.0076549
48	0.0033389	-0.0066778
49	0.0019930	-0.0067089
50	0.0004644	-0.0068609
51	-0.0002837	-0.0069919
52	-0.0005740	-0.0069984
53	-0.0006979	-0.0069101
54	-0.0009155	-0.0067190
55	-0.0014457	-0.0064801
56	0.0034469	-0.0054150
57	0.0012530	-0.0055858
58	0.0001838	-0.0058727
59	-0.0003453	-0.0061311
60	-0.0005927	-0.0062471
61	0.0035101	-0.0041594
62	0.0021088	-0.0042466
63	0.0007865	-0.0046314
64	0.0000456	-0.0050971
65	-0.0003751	-0.0054353
66	-0.0006000	-0.0056232
67	-0.0008164	-0.0057260
68	-0.0013237	-0.0057325
69	-0.0024063	-0.0055829
70	0.0034500	-0.0025663
71	0.0014599	-0.0032800
72	0.0005619	-0.0039651
73	-0.0000228	-0.0044968
74	-0.0003972	-0.0048740
75	0.0029579	-0.0011066
76	0.0021931	-0.0017626
77	0.0011700	-0.0027786
78	0.0004382	-0.0034952
79	-0.0000682	-0.0040234
80	-0.0004387	-0.0044083
81	-0.0010615	-0.0047319
82	-0.0019478	-0.0047784
83	0.0029703	-0.0004887
84	0.0018473	-0.0015957
85	0.0009831	-0.0024854
86	0.0003480	-0.0031447
87	-0.0001201	-0.0036283
88	0.0024698	-0.0007042
89	0.0015725	-0.0015431
90	0.0008323	-0.0022857
91	0.0002582	-0.0028600
92	-0.0002042	-0.0032651
93	-0.0006102	-0.0035424

98	-0.0014781	-0.0038358
100	-0.0027820	-0.0038657
101	0.0027166	-0.0002369
102	0.0020581	-0.0008402
103	0.0013434	-0.0015100
104	0.0006912	-0.0021229
106	0.0001479	-0.0026086
107	0.0024009	-0.0004080
108	0.0018022	-0.0009209
109	0.0011404	-0.0014632
110	0.0005501	-0.0019706
111	0.0000185	-0.0023862
112	-0.0009394	-0.0028254
114	-0.0020566	-0.0030006
115	0.0025036	-0.0001561
116	0.0021222	-0.0005206
117	0.0015465	-0.0009527
118	0.0009500	-0.0013876
120	0.0003927	-0.0018040
121	0.0022877	-0.0002770
122	0.0018658	-0.0005778
123	0.0013152	-0.0009493
124	0.0007722	-0.0013000
125	0.0002001	-0.0016048
126	-0.0003157	-0.0018479
127	-0.0014037	-0.0021488
129	-0.0027045	-0.0022467
130	0.0022152	-0.0001645
131	0.0014250	-0.0005933
132	0.0003512	-0.0010727
133	-0.0007557	-0.0013640
135	-0.0019445	-0.0015110
136	0.0018487	-0.0001873
137	0.0009782	-0.0004577
138	-0.0001186	-0.0007091
139	-0.0012696	-0.0008587
141	-0.0024551	-0.0009387
142	0.0020452	-0.0000136
143	0.0014535	-0.0000849
144	0.0004916	-0.0002016
145	-0.0006319	-0.0002999
147	-0.0017914	-0.0003645
148	0.0017588	0.0000961
149	0.0010049	0.0001431
150	-0.0000333	0.0001458
151	-0.0011697	0.0001353
152	-0.0022605	0.0001091
153	0.0019206	0.0001260
154	0.0013933	0.0003428
155	0.0005029	0.0004907
156	-0.0005853	0.0005698
157	-0.0016994	0.0005961
159	0.0016514	0.0004098
160	0.0009482	0.0007392
161	-0.0000412	0.0009532
162	-0.0011408	0.0010561
163	-0.0022087	0.0010752
165	0.0017760	0.0003269
166	0.0012805	0.0008889
167	0.0004390	0.0012960
168	-0.0006034	0.0015169
169	-0.0016778	0.0015823
170	-0.0022046	0.0015865

RESULTANT JOINT DISPLACEMENTS - SUPPORTS

JOINT	/-----DISPLACEMENT-----/		
	X DISP.	Y DISP.	Z DISP.
1	0.0	-0.0326343	
2	0.0	-0.0307897	
3	0.0	-0.0279135	
4	0.0	-0.0259144	
5	0.0	-0.0239473	
6	0.0	-0.0225053	
7	0.0	-0.0211432	
9	0.0	-0.0191726	
8	0.0	-0.0201205	
10	0.0	-0.0184778	
11	0.0	-0.0174939	
12	0.0	-0.0165870	
13	0.0	-0.0161100	
14	0.0	-0.0155112	
15	0.0	-0.0152098	
75	0.0075018	0.0	
84	0.0066090	0.0	
90	0.0062031	0.0	
99	0.0057173	0.0	
105	0.0054506	0.0	
113	0.0051573	0.0	
119	0.0049893	0.0	
128	0.0046751	0.0	
134	0.0045515	0.0	
140	0.0042973	0.0	
146	0.0042060	0.0	
152	0.0040020	0.0	
158	0.0039271	0.0	
164	0.0036801	0.0	

RESULTANT JOINT DISPLACEMENTS - FREE JOINTS

JOINT	/-----DISPLACEMENT-----/		
	X DISP.	Y DISP.	Z DISP.
16	0.0022795	-0.0312047	
17	-0.0001187	-0.0266604	
18	-0.0004077	-0.0231971	
19	-0.0004205	-0.0206582	
20	-0.0003740	-0.0188111	
21	0.0042520	-0.0269092	
22	0.0012127	-0.0258665	
23	-0.0004228	-0.0232197	
24	-0.0007237	-0.0208635	
25	-0.0007384	-0.0190020	
26	-0.0006814	-0.0175782	
27	-0.0007234	-0.0159729	
28	-0.0010775	-0.0150863	
29	0.0051342	-0.0222131	
30	0.0005103	-0.0218212	
31	-0.0006917	-0.0203114	
32	-0.0009747	-0.0187453	
33	-0.0009854	-0.0174393	
34	0.0058749	-0.0187645	

35	0.0030090	-0.0187906
36	0.0000488	-0.0187037
37	-0.0009056	-0.0178245
38	-0.0011501	-0.0168508
39	-0.0011282	-0.0160329
40	-0.0012473	-0.0154439
41	-0.0015845	-0.0144907
42	-0.0028563	-0.0138221
43	0.0063057	-0.0159644
44	0.0017535	-0.0161393
45	-0.0003208	-0.0161272
46	-0.0010514	-0.0157069
47	-0.0012531	-0.0152005
48	0.0066489	-0.0134426
49	0.0039229	-0.0135011
50	0.0008809	-0.0137817
51	-0.0005703	-0.0139806
52	-0.0011238	-0.0139330
53	-0.0013675	-0.0137283
54	-0.0018058	-0.0133344
55	-0.0028599	-0.0128583
56	0.0068708	-0.0108787
57	0.0024516	-0.0112155
58	0.0003342	-0.0117681
59	-0.0006929	-0.0122429
60	-0.0011690	-0.0124363
61	0.0069984	-0.0083443
62	0.0041755	-0.0085160
63	0.0015292	-0.0092820
64	0.0000674	-0.0101951
65	-0.0007517	-0.0108425
66	-0.0011870	-0.0111931
67	-0.0016143	-0.0113841
68	-0.0026200	-0.0113837
69	-0.0047628	-0.0110845
70	0.0068777	-0.0051417
71	0.0028788	-0.0065691
72	0.0010894	-0.0079339
73	-0.0000629	-0.0089819
74	-0.0007947	-0.0097156
76	0.0058885	-0.0022145
77	0.0043524	-0.0035261
78	0.0023037	-0.0055578
79	0.0008495	-0.0069845
80	-0.0001489	-0.0080281
81	-0.0008763	-0.0087816
82	-0.0021048	-0.0094095
83	-0.0038594	-0.0094949
85	0.0059136	-0.0009756
86	0.0036612	-0.0031886
87	0.0019353	-0.0049657
88	0.0006750	-0.0062778
89	-0.0002489	-0.0072344
91	0.0049097	-0.0014049
92	0.0031140	-0.0030809
93	0.0016387	-0.0045629
94	0.0005003	-0.0057053
95	-0.0004130	-0.0065080
96	-0.0012155	-0.0070550
97	-0.0029324	-0.0076305
98	-0.0055150	-0.0076864
100	0.0054043	-0.0004719
101	0.0041685	-0.0016757
102	0.0026590	-0.0030132
103	0.0013612	-0.0042355
104	0.0002841	-0.0052018

106	0.0047727	-0.0008129
107	0.0035764	-0.0018365
108	0.0022567	-0.0029197
109	0.0010835	-0.0039303
110	0.0000292	-0.0047571
111	-0.0018675	-0.0056276
112	-0.0040809	-0.0059726
114	0.0049783	-0.0003108
115	0.0042162	-0.0010375
116	0.0032674	-0.0018998
117	0.0018797	-0.0027676
118	0.0007729	-0.0035975
120	0.0045471	-0.0005519
121	0.0037054	-0.0011519
122	0.0026079	-0.0018934
123	0.0015280	-0.0025929
124	0.0003918	-0.0032004
125	-0.0006313	-0.0036843
126	-0.0027882	-0.0042821
127	-0.0053691	-0.0044750
129	0.0044028	-0.0003279
130	0.0028284	-0.0011839
131	0.0006936	-0.0021409
132	-0.0015031	-0.0027215
133	-0.0038624	-0.0030137
135	0.0036731	-0.0003743
136	0.0019412	-0.0009153
137	-0.0002380	-0.0014178
138	-0.0025232	-0.0017163
139	-0.0048785	-0.0018750
141	0.0040648	-0.0000278
142	0.0028876	-0.0001719
143	0.0009752	-0.0004066
144	-0.0012567	-0.0006039
145	-0.0035602	-0.0007327
147	0.0034953	0.0001893
148	0.0019964	0.0002805
149	-0.0000670	0.0002839
150	-0.0023252	0.0002699
151	-0.0044938	0.0002098
153	0.0038175	0.0002497
154	0.0027690	0.0006789
155	0.0009990	0.0009710
156	-0.0011637	0.0011271
157	-0.0033782	0.0011789
159	0.0032825	0.0008131
160	0.0018845	0.0014661
161	-0.0000822	0.0018901
162	-0.0022679	0.0020939
163	-0.0043911	0.0021318
165	0.0035304	0.0006490
166	0.0025453	0.0017646
167	0.0008725	0.0025723
168	-0.0011994	0.0030104
169	-0.0033354	0.0031402
170	-0.0043828	0.0031485

LOADING - THREE

X=0.30

RESULTANT JOINT DISPLACEMENTS - SUPPORTS

JOINT

/-----DISPLACEMENT-----/

1	0.0	-0.0442600
2	0.0	-0.0424244
3	0.0	-0.0394522
4	0.0	-0.0372255
5	0.0	-0.0347080
6	0.0	-0.0328186
7	0.0	-0.0309551
9	0.0	-0.0282072
8	0.0	-0.0295421
10	0.0	-0.0272251
11	0.0	-0.0258197
12	0.0	-0.0245068
13	0.0	-0.0238168
14	0.0	-0.0229396
15	0.0	-0.0224971
75	0.0111974	0.0
84	0.0098506	0.0
90	0.0092380	0.0
99	0.0085070	0.0
105	0.0081058	0.0
113	0.0076657	0.0
119	0.0074136	0.0
128	0.0069442	0.0
134	0.0067596	0.0
140	0.0063815	0.0
146	0.0062458	0.0
152	0.0059431	0.0
158	0.0058324	0.0
164	0.0054659	0.0

RESULTANT JOINT DISPLACEMENTS - FREE JOINTS

JOINT	/-----DISPLACEMENT-----/		
	X DISP.	Y DISP.	Z DISP.
16	0.0028162	-0.0432631	
17	0.0002781	-0.0383869	
18	-0.0004267	-0.0338105	
19	-0.0005451	-0.0303114	
20	-0.0005171	-0.0277030	
21	0.0053347	-0.0402890	
22	0.0021635	-0.0382726	
23	-0.0002872	-0.0340157	
24	-0.0009006	-0.0306455	
25	-0.0010071	-0.0279882	
26	-0.0009649	-0.0259410	
27	-0.0010549	-0.0236167	
28	-0.0015861	-0.0223186	
29	0.0070118	-0.0348887	
30	0.0009536	-0.0326077	
31	-0.0008024	-0.0300110	
32	-0.0013096	-0.0276646	
33	-0.0013849	-0.0257542	
34	0.0085743	-0.0288568	
35	0.0041783	-0.0288746	
36	0.0001652	-0.0280215	
37	-0.0012068	-0.0264474	
38	-0.0016090	-0.0249392	
39	-0.0016175	-0.0237183	
40	-0.0018091	-0.0228494	
41	-0.0023298	-0.0214471	

42	-0.0042072	-0.0204609
43	0.0093440	-0.0243863
44	0.0024426	-0.0245553
45	-0.0004374	-0.0241586
46	-0.0014796	-0.0233500
47	-0.0017939	-0.0225324
48	0.0099094	-0.0203998
49	0.0057120	-0.0204742
50	0.0012068	-0.0208332
51	-0.0008350	-0.0209209
52	-0.0016222	-0.0207274
53	-0.0019851	-0.0203672
54	-0.0026512	-0.0197562
55	-0.0042171	-0.0190469
56	0.0102528	-0.0164454
57	0.0035370	-0.0169404
58	0.0004265	-0.0177108
59	-0.0010300	-0.0182971
60	-0.0017100	-0.0185037
61	0.0104455	-0.0125834
62	0.0061552	-0.0128336
63	0.0021862	-0.0139746
64	0.0000494	-0.0152946
65	-0.0011223	-0.0161851
66	-0.0017471	-0.0166547
67	-0.0023765	-0.0169096
68	-0.0038659	-0.0168818
69	-0.0070286	-0.0164325
70	0.0102625	-0.0077362
71	0.0042154	-0.0098783
72	0.0015521	-0.0119118
73	-0.0001313	-0.0134430
74	-0.0011874	-0.0144890
76	0.0087657	-0.0033251
77	0.0064444	-0.0052924
78	0.0033670	-0.0083356
79	0.0012113	-0.0104629
80	-0.0022497	-0.0119552
81	-0.0013086	-0.0130844
82	-0.0031133	-0.0139817
83	-0.0057039	-0.0140939
85	0.0088018	-0.0014590
86	0.0054094	-0.0047768
87	0.0028287	-0.0074372
88	0.0009640	-0.0093883
89	-0.0003915	-0.0107563
91	0.0072911	-0.0020990
92	0.0045955	-0.0046090
93	0.0023968	-0.0068241
94	0.0007135	-0.0085219
95	-0.0006284	-0.0097064
96	-0.0018102	-0.0105085
97	-0.0043419	-0.0113453
98	-0.0081573	-0.0114205
100	0.0080359	-0.0007032
101	0.0061803	-0.0025024
102	0.0039217	-0.0045035
103	0.0019920	-0.0063281
104	0.0003999	-0.0077646
106	0.0070884	-0.0012119
107	0.0052968	-0.0027419
108	0.0033274	-0.0043596
109	0.0015861	-0.0058689
110	0.0000264	-0.0070974
111	-0.0027738	-0.0083833
112	-0.0060445	-0.0088883

114	0.0073971	-0.0004629
115	0.0062563	-0.0015474
116	0.0045398	-0.0028363
117	0.0027713	-0.0041326
118	0.0011299	-0.0053701
120	0.0067521	-0.0008230
121	0.0054946	-0.0017188
122	0.0038578	-0.0028270
123	0.0022532	-0.0038720
124	0.0005682	-0.0047775
125	-0.0009460	-0.0054975
126	-0.0041363	-0.0063840
127	-0.0079586	-0.0066666
129	0.0065372	-0.0004891
130	0.0041906	-0.0017691
131	0.0010196	-0.0031997
132	-0.0022347	-0.0040654
133	-0.0057297	-0.0044991
135	0.0054509	-0.0005608
136	0.0028755	-0.0013720
137	-0.0003587	-0.0021247
138	-0.0037463	-0.0025706
139	-0.0072419	-0.0028054
141	0.0060351	-0.0000433
142	0.0042845	-0.0002626
143	0.0014437	-0.0006173
144	-0.0018683	-0.0009148
145	-0.0052861	-0.0011071
147	0.0051892	0.0002770
148	0.0029619	0.0004076
149	-0.0001018	0.0004081
150	-0.0034536	0.0003848
151	-0.0066750	0.0002955
153	0.0056688	0.0003689
154	0.0041107	0.0010023
155	0.0014820	0.0014321
156	-0.0017291	0.0016608
157	-0.0050178	0.0017368
159	0.0048745	0.0012040
160	0.0027978	0.0021700
161	-0.0001229	0.0027965
162	-0.0033688	0.0030973
163	-0.0065230	0.0031535
165	0.0052435	0.0009622
166	0.0037800	0.0026155
167	0.0012953	0.0038115
168	-0.0017817	0.0044597
169	-0.0049546	0.0046518
170	-0.0065107	0.0046641

LOADING - FOUR X=0.40

RESULTANT JOINT DISPLACEMENTS - SUPPORTS

JOINT	DISPLACEMENT		
	X DISP.	Y DISP.	Z DISP.
1	0.0	-0.0542105	
2	0.0	-0.0523738	
3	0.0	-0.0494680	
4	0.0	-0.0471702	
5	0.0	-0.0443765	

6	0.0	-0.0422244
7	0.0	-0.0400039
9	0.0	-0.0366561
8	0.0	-0.0383010
10	0.0	-0.0354410
11	0.0	-0.0336806
12	0.0	-0.0320086
13	0.0	-0.0311310
14	0.0	-0.0299976
15	0.0	-0.0294242
75	0.0148169	0.0
84	0.0130088	0.0
90	0.0121867	0.0
99	0.0112291	0.0
105	0.0106729	0.0
113	0.0100868	0.0
119	0.0097511	0.0
128	0.0091293	0.0
134	0.0088851	0.0
140	0.0083870	0.0
146	0.0082087	0.0
152	0.0078112	0.0
158	0.0076664	0.0
164	0.0071854	0.0

RESULANT JCINT DISPLACEMENTS - FREE JCINTS

JCINT	DISPLACEMENT		
	X DISP.	Y DISP.	Z DISP.
16	0.0030787	-0.0534407	
17	0.0006697	-0.0485993	
18	-0.0003336	-0.0434599	
19	-0.0006022	-0.0392643	
20	-0.0006214	-0.0360420	
21	0.0059713	-0.0509610	
22	0.0030772	-0.0489535	
23	0.0000567	-0.0439011	
24	-0.0009336	-0.0397345	
25	-0.0011884	-0.0364162	
26	-0.0011950	-0.0338332	
27	-0.0013556	-0.0308736	
28	-0.0020618	-0.0291974	
29	0.0084659	-0.0469846	
30	0.0016702	-0.0427972	
31	-0.0007144	-0.0391395	
32	-0.0015101	-0.0360705	
33	-0.0016976	-0.0336154	
34	0.0108211	-0.0404661	
35	0.0052399	-0.0394654	
36	0.0004481	-0.0370647	
37	-0.0013586	-0.0346837	
38	-0.0019566	-0.0326307	
39	-0.0020330	-0.0310235	
40	-0.0023084	-0.0298933	
41	-0.0030243	-0.0280727	
42	-0.0054734	-0.0267877	
43	0.0120226	-0.0334247	
44	0.0030167	-0.0332150	
45	-0.0004623	-0.0320227	
46	-0.0018024	-0.0307061	
47	-0.0022473	-0.0295416	
48	0.0129952	-0.0276488	

49	0.0072914	-0.0277348
50	0.0014550	-0.0279870
51	-0.0010494	-0.0277283
52	-0.0020472	-0.0272858
53	-0.0025323	-0.0267338
54	-0.0034345	-0.0258923
55	-0.0054938	-0.0249572
56	0.0135200	-0.0221899
57	0.0044663	-0.0228060
58	0.0004645	-0.0226734
59	-0.0013391	-0.0242281
60	-0.0021985	-0.0243727
61	0.0138031	-0.0169103
62	0.0079931	-0.0172331
63	0.0027280	-0.0187224
64	-0.0000085	-0.0203659
65	-0.0014768	-0.0214075
66	-0.0022665	-0.0219413
67	-0.0030875	-0.0222308
68	-0.0050402	-0.0221517
69	-0.0091655	-0.0215564
70	0.0135655	-0.0103656
71	0.0054277	-0.0132204
72	0.0019287	-0.0158947
73	-0.0002296	-0.0178490
74	-0.0015672	-0.0191444
76	0.0115516	-0.0044422
77	0.0084285	-0.0070654
78	0.0043272	-0.0111241
79	0.0015076	-0.0139168
80	-0.0003724	-0.0158931
81	-0.0017286	-0.0172706
82	-0.0040705	-0.0183915
83	-0.0074518	-0.0185152
85	0.0116001	-0.0019381
86	0.0070568	-0.0063586
87	0.0036378	-0.0098926
88	0.0012025	-0.0124577
89	-0.0005492	-0.0142824
91	0.0095802	-0.0027839
92	0.0059869	-0.0061220
93	0.0030861	-0.0090577
94	0.0008883	-0.0112890
95	-0.0008500	-0.0128309
96	-0.0023868	-0.0138665
97	-0.0056853	-0.0149358
98	-0.0106679	-0.0150219
100	0.0105786	-0.0009291
101	0.0081037	-0.0033162
102	0.0051060	-0.0059728
103	0.0025672	-0.0083870
104	0.0004888	-0.0102760
106	0.0093167	-0.0016022
107	0.0069357	-0.0036317
108	0.0043314	-0.0057765
109	0.0020454	-0.0077715
110	0.0000061	-0.0093867
111	-0.0036465	-0.0110640
112	-0.0079189	-0.0117151
114	0.0097289	-0.0006111
115	0.0082133	-0.0020466
116	0.0059392	-0.0037559
117	0.0036074	-0.0054728
118	0.0014546	-0.0071075
120	0.0088731	-0.0010881
121	0.0072073	-0.0022743

122	0.0050441	-0.0037437
123	0.0029338	-0.0051277
124	0.0007233	-0.0063233
125	-0.0012580	-0.0072716
126	-0.0054299	-0.0084338
127	-0.0104364	-0.0087987
129	0.0035900	-0.0006470
130	0.0054907	-0.0023453
131	0.0013220	-0.0042414
132	-0.0029419	-0.0053848
133	-0.0075215	-0.0059541
135	0.0071578	-0.0007459
136	0.0037666	-0.0018258
137	-0.0004812	-0.0028260
138	-0.0049234	-0.0034164
139	-0.0095144	-0.0037235
141	0.0079300	-0.0000603
142	0.0056247	-0.0003581
143	0.0018893	-0.0008350
144	-0.0024597	-0.0012334
145	-0.0069472	-0.0014880
147	0.0068176	0.0003570
148	0.0038880	0.0005202
149	-0.0001383	0.0005129
150	-0.0045411	0.0004781
151	-0.0087771	0.0003605
153	0.0074501	0.0004818
154	0.0054006	0.0013073
155	0.0019446	0.0018652
156	-0.0022752	0.0021606
157	-0.0065977	0.0022588
159	0.0064064	0.0015764
160	0.0036756	0.0028398
161	-0.0001635	0.0036578
162	-0.0044301	0.0040501
163	-0.0085780	0.0041236
165	0.0068928	0.0012620
166	0.0049681	0.0034291
167	0.0017015	0.0049951
168	-0.0023434	0.0058431
169	-0.0065155	0.0060945
170	-0.0085620	0.0061105

LOADING - FIVE

X=0.50

RESULTANT JOINT DISPLACEMENTS - SUPPORTS

JOINT	/-----DISPLACEMENT-----/		
	X DISP.	Y DISP.	Z DISP.
1	0.0	-0.0627331	
2	0.0	-0.0609151	
3	0.0	-0.0580746	
4	0.0	-0.0557599	
5	0.0	-0.0528791	
6	0.0	-0.0506021	
7	0.0	-0.0481533	
9	0.0	-0.0443764	
8	0.0	-0.0462534	
10	0.0	-0.0429839	
11	0.0	-0.0409405	
12	0.0	-0.0389633	

13	0.0	-0.0379271
14	0.0	-0.0365647
15	0.0	-0.0358733
75	0.0183409	0.0
84	0.0160571	0.0
90	0.0150195	0.0
99	0.0137924	0.0
105	0.0131200	0.0
113	0.0123885	0.0
119	0.0119697	0.0
128	0.0111994	0.0
134	0.0108971	0.0
140	0.0102843	0.0
146	0.0100657	0.0
152	0.0095787	0.0
158	0.0094023	0.0
164	0.0088135	0.0

RESULTANT JOINT DISPLACEMENTS - FREE JOINTS

JOINT	/-----DISPLACEMENT-----/		
	X DISP.	Y DISP.	Z DISP.
16	0.0032834	-0.0620850	
17	0.0009768	-0.0573232	
18	-0.0001749	-0.0520165	
19	-0.0006027	-0.0473689	
20	-0.0006881	-0.0436840	
21	0.0064372	-0.0598785	
22	0.0037247	-0.0579043	
23	0.0005044	-0.0526868	
24	-0.0008512	-0.0479671	
25	-0.0012864	-0.0441369	
26	-0.0013686	-0.0411167	
27	-0.0016197	-0.0376189	
28	-0.0024957	-0.0356060	
29	0.0093817	-0.0565815	
30	0.0025217	-0.0519957	
31	-0.0004665	-0.0474871	
32	-0.0015836	-0.0438033	
33	-0.0019199	-0.0408824	
34	0.0121951	-0.0515169	
35	0.0064921	-0.0494791	
36	0.0009027	-0.0455281	
37	-0.0013603	-0.0423520	
38	-0.0021870	-0.0397818	
39	-0.0023658	-0.0378200	
40	-0.0027348	-0.0364546	
41	-0.0036549	-0.0342561	
42	-0.0066311	-0.0326968	
43	0.0141061	-0.0438798	
44	0.0036775	-0.0417008	
45	-0.0003580	-0.0395130	
46	-0.0020039	-0.0376279	
47	-0.0026012	-0.0361029	
48	0.0158482	-0.0354941	
49	0.0085038	-0.0355423	
50	0.0017226	-0.0350602	
51	-0.0011787	-0.0342612	
52	-0.0022802	-0.0335009	
53	-0.0029943	-0.0327192	
54	-0.0041399	-0.0316412	
55	-0.0066662	-0.0304920	

56	0.0166393	-0.0282654
57	0.0051669	-0.0289256
58	0.0004923	-0.0295600
59	-0.0015941	-0.0299328
60	-0.0026168	-0.0299447
61	0.0170498	-0.0213993
62	0.0096128	-0.0217799
63	0.0031156	-0.0235655
64	-0.0000864	-0.0253465
65	-0.0017954	-0.0264292
66	-0.0027305	-0.0269694
67	-0.0037310	-0.0272629
68	-0.0061209	-0.0271088
69	-0.0111342	-0.0263708
70	0.0167659	-0.0130572
71	0.0064596	-0.0166227
72	0.0021954	-0.0198871
73	-0.0003489	-0.0221503
74	-0.0019209	-0.0236145
76	0.0142148	-0.0055715
77	0.0102582	-0.0088522
78	0.0051444	-0.0139176
79	0.0017221	-0.0173335
80	-0.0005131	-0.0196774
81	-0.0021259	-0.0212814
82	-0.0049583	-0.0225717
83	-0.0090719	-0.0226904
85	0.0142768	-0.0024105
86	0.0085623	-0.0079331
87	0.0043333	-0.0123259
88	0.0013790	-0.0154648
89	-0.0007195	-0.0176523
91	0.0117425	-0.0034554
92	0.0072542	-0.0076138
93	0.0036844	-0.0112510
94	0.0010165	-0.0139821
95	-0.0010747	-0.0158443
96	-0.0029354	-0.0170840
97	-0.0069394	-0.0183495
98	-0.0130027	-0.0184368
100	0.0130002	-0.0011469
101	0.0099055	-0.0041109
102	0.0061840	-0.0074119
103	0.0030699	-0.0103960
104	0.0005452	-0.0127106
106	0.0114256	-0.0019796
107	0.0084632	-0.0044986
108	0.0052457	-0.0071580
109	0.0024483	-0.0096217
110	-0.0000345	-0.0115996
111	-0.0044717	-0.0136343
112	-0.0096724	-0.0144133
114	0.0119417	-0.0007534
115	0.0100570	-0.0025300
116	0.0072395	-0.0046505
117	0.0043692	-0.0067759
118	0.0017376	-0.0087920
120	0.0108792	-0.0013443
121	0.0088156	-0.0028129
122	0.0061442	-0.0046348
123	0.0035550	-0.0063479
124	0.0008516	-0.0078217
125	-0.0015644	-0.0089866
126	-0.0066485	-0.0104059
127	-0.0127618	-0.0108432
129	0.0105308	-0.0007997

130	0.0067066	-0.0029069
131	0.0015234	-0.0052561
132	-0.0036150	-0.0066656
133	-0.0092095	-0.0073621
135	0.0037675	-0.0009281
136	0.0045989	-0.0022735
137	-0.0006050	-0.0035162
138	-0.0060368	-0.0042460
139	-0.0116610	-0.0046203
141	0.0097212	-0.0000791
142	0.0068873	-0.0004587
143	0.0023039	-0.0010598
144	-0.0030227	-0.0015594
145	-0.0085183	-0.0018743
147	0.0083561	0.0004271
148	0.0047598	0.0006143
149	-0.0001768	0.0005935
150	-0.0055717	0.0005445
151	-0.0107688	0.0004001
153	0.0091350	0.0005860
154	0.0066189	0.0015880
155	0.0023794	0.0022614
156	-0.0027942	0.0026157
157	-0.0080947	0.0027336
159	0.0078553	0.0019240
160	0.0045046	0.0034637
161	-0.0002039	0.0044585
162	-0.0054363	0.0049350
163	-0.0105260	0.0050247
165	0.0084541	0.0015436
166	0.0060919	0.0041921
167	0.0020846	0.0061036
168	-0.0028763	0.0071373
169	-0.0079950	0.0074438
170	-0.0105064	0.0074634

LOADING - SIX X=0.60

RESULTANT JOINT DISPLACEMENTS - SUPPORTS

JOINT /-----DISPLACEMENT-----/

X DISP. Y DISP. Z DISP.

1	0.0	-0.0699904
2	0.0	-0.0681953
3	0.0	-0.0654193
4	0.0	-0.0631169
5	0.0	-0.0602154
6	0.0	-0.0578800
7	0.0	-0.0552992
9	0.0	-0.0512377
8	0.0	-0.0532765
10	0.0	-0.0497193
11	0.0	-0.0474639
12	0.0	-0.0452388
13	0.0	-0.0440747
14	0.0	-0.0425145
15	0.0	-0.0417200
75	0.0217112	0.0
84	0.0189400	0.0
90	0.0176840	0.0
99	0.0162080	0.0

105	0.0154004	0.0
113	0.0145265	0.0
119	0.0140265	0.0
128	0.0131141	0.0
134	0.0127564	0.0
140	0.0120365	0.0
146	0.0117805	0.0
152	0.0112111	0.0
158	0.0110061	0.0
164	0.0103182	0.0

----- RESULTANT JOINT DISPLACEMENTS - FREE JOINTS -----

JOINT	/-----DISPLACEMENT-----/		
	X DISP.	Y DISP.	Z DISP.
16	0.0034369	-0.0694078	
17	0.0012230	-0.0647427	
18	-0.0000157	-0.0594064	
19	-0.0005670	-0.0545017	
20	-0.0007227	-0.0504940	
21	0.0067624	-0.0673825	
22	0.0042194	-0.0654364	
23	0.0009184	-0.0602267	
24	-0.0007040	-0.0552046	
25	-0.0013167	-0.0510117	
26	-0.0014888	-0.0476556	
27	-0.0018433	-0.0437231	
28	-0.0028796	-0.0414207	
29	0.0099444	-0.0644566	
30	0.0032731	-0.0598218	
31	-0.0001312	-0.0548555	
32	-0.0015567	-0.0507095	
33	-0.0020588	-0.0474155	
34	0.0130764	-0.0599291	
35	0.0076386	-0.0578631	
36	0.0014793	-0.0531006	
37	-0.0012365	-0.0492646	
38	-0.0023089	-0.0462439	
39	-0.0026151	-0.0439734	
40	-0.0030835	-0.0424052	
41	-0.0042099	-0.0398775	
42	-0.0076579	-0.0380738	
43	0.0157461	-0.0537681	
44	0.0045175	-0.0495739	
45	-0.0001181	-0.0463970	
46	-0.0020859	-0.0439518	
47	-0.0028537	-0.0420795	
48	0.0182209	-0.0448141	
49	0.0095473	-0.0437607	
50	0.0020806	-0.0418079	
51	-0.0012035	-0.0403449	
52	-0.0026126	-0.0392211	
53	-0.0033633	-0.0382010	
54	-0.0047547	-0.0368904	
55	-0.0077118	-0.0355439	
56	0.0193392	-0.0349122	
57	0.0056899	-0.0352078	
58	0.0005532	-0.0352151	
59	-0.0017756	-0.0352759	
60	-0.0029529	-0.0351005	
61	0.0200518	-0.0261211	
62	0.0109547	-0.0265450	

63	0.0033676	-0.0284381
64	-0.0001587	-0.0301253
65	-0.0020619	-0.0311411
66	-0.0031268	-0.0316346
67	-0.0042933	-0.0319049
68	-0.0070870	-0.0316566
69	-0.0128964	-0.0307834
70	0.0107736	-0.0158581
71	0.0072723	-0.0201019
72	0.0023581	-0.0238237
73	-0.0004737	-0.0262606
74	-0.0022348	-0.0278077
76	0.0166870	-0.0067254
77	0.0118772	-0.0106644
78	0.0057912	-0.0167107
79	0.0018555	-0.0206626
80	-0.0006617	-0.0232764
81	-0.0024884	-0.0250377
82	-0.0057582	-0.0264406
83	-0.0105322	-0.0265386
85	0.0167753	-0.0028774
86	0.0098830	-0.0094963
87	0.0048945	-0.0147158
88	0.0014918	-0.0183628
89	-0.0008954	-0.0208433
91	0.0137305	-0.0041104
92	0.0083638	-0.0090724
93	0.0041757	-0.0133772
94	0.0010959	-0.0165570
95	-0.0012962	-0.0186913
96	-0.0034438	-0.0200999
97	-0.0080790	-0.0215204
98	-0.0151158	-0.0215994
100	0.0152533	-0.0013548
101	0.0115457	-0.0048795
102	0.0071288	-0.0088041
103	0.0034872	-0.0123264
104	0.0025681	-0.0150272
106	0.0133725	-0.0023399
107	0.0098453	-0.0053323
108	0.0060484	-0.0084852
109	0.0027848	-0.0113894
110	-0.0000949	-0.0136975
111	-0.0052330	-0.0160460
112	-0.0112706	-0.0169315
114	0.0139923	-0.0008880
115	0.0117494	-0.0029914
116	0.0084121	-0.0055077
117	0.0050390	-0.0080222
118	0.0019716	-0.0103961
120	0.0127306	-0.0015880
121	0.0102861	-0.0033270
122	0.0071340	-0.0054871
123	0.0041025	-0.0075134
124	0.0009494	-0.0092476
125	-0.0018597	-0.0106123
126	-0.0077684	-0.0122636
127	-0.0148892	-0.0127617
129	0.0123216	-0.0009449
130	0.0078126	-0.0034456
131	0.0018270	-0.0062270
132	-0.0042414	-0.0078854
133	-0.0107608	-0.0086975
135	0.0102478	-0.0011048
136	0.0053550	-0.0027084
137	-0.0007289	-0.0041840

138	-0.0070656	-0.0050457
139	-0.0136404	-0.0054804
141	0.0113736	-0.0000996
142	0.0080467	-0.0005635
143	0.0026784	-0.0012892
144	-0.0035474	-0.0018885
145	-0.0099696	-0.0022604
147	0.0057743	0.0004854
148	0.0055597	0.0006869
149	-0.0002175	0.0006465
150	-0.0065263	0.0005807
151	-0.0126124	0.0004115
153	0.0106904	0.0006795
154	0.0077415	0.0018381
155	0.0027771	0.0026118
156	-0.0032768	0.0030158
157	-0.0094805	0.0031503
159	0.0091928	0.0022396
160	0.0052680	0.0040288
161	-0.0002439	0.0051819
162	-0.0063686	0.0057333
163	-0.0123300	0.0058377
165	0.0098969	0.0018013
166	0.0071293	0.0048894
167	0.0024367	0.0071144
168	-0.0032710	0.0083158
169	-0.0093654	0.0086721
170	-0.0123072	0.0086949

LOADING - SEVEN

X=0.70

RESULTANT JOINT DISPLACEMENTS - SUPPORTS

JOINT	/-----DISPLACEMENT-----/		
	X DISP.	Y DISP.	Z DISP.
1	0.0	-0.0760185	
2	0.0	-0.0742505	
3	0.0	-0.0715247	
4	0.0	-0.0692428	
5	0.0	-0.0663422	
6	0.0	-0.0639834	
7	0.0	-0.0613372	
9	0.0	-0.0571042	
8	0.0	-0.0592464	
10	0.0	-0.0555038	
11	0.0	-0.0531008	
12	0.0	-0.0506851	
13	0.0	-0.0494236	
14	0.0	-0.0477002	
15	0.0	-0.0468193	
75	0.0249012	0.0	
84	0.0216154	0.0	
90	0.0201319	0.0	
99	0.0184061	0.0	
105	0.0174638	0.0	
113	0.0164513	0.0	
119	0.0158725	0.0	
128	0.0148263	0.0	
134	0.0144164	0.0	
140	0.0135989	0.0	
146	0.0133093	0.0	

152	0.0126665	0.0
158	0.0124366	0.0
164	0.0116611	0.0

RESULTANT JOINT DISPLACEMENTS - FREE JOINTS

JOINT	DISPLACEMENT		
	X DISP.	Y DISP.	Z DISP.
16	0.0035701	-0.0754725	
17	0.0014092	-0.0708904	
18	0.0001199	-0.0655684	
19	-0.0005135	-0.0605435	
20	-0.0007333	-0.0563301	
21	0.0070387	-0.0735463	
22	0.0045884	-0.0716314	
23	0.0012520	-0.0664625	
24	-0.0005341	-0.0613211	
25	-0.0013001	-0.0568561	
26	-0.0015631	-0.0532999	
27	-0.0020244	-0.0490363	
28	-0.0032052	-0.0464567	
29	0.0103963	-0.0708166	
30	0.0038476	-0.0661996	
31	0.0002212	-0.0610848	
32	-0.0014654	-0.0566305	
33	-0.0021292	-0.0530598	
34	0.0137465	-0.0665627	
35	0.0084584	-0.0645152	
36	0.0020758	-0.0595374	
37	-0.0010346	-0.0552286	
38	-0.0023440	-0.0518501	
39	-0.0027870	-0.0493287	
40	-0.0033537	-0.0475958	
41	-0.0046779	-0.0447955	
42	-0.0085309	-0.0427830	
43	0.0168166	-0.0610552	
44	0.0054170	-0.0563949	
45	0.0002138	-0.0524192	
46	-0.0020694	-0.0494881	
47	-0.0030132	-0.0473098	
48	0.0196734	-0.0534937	
49	0.0107453	-0.0512990	
50	0.0025348	-0.0478789	
51	-0.0011303	-0.0457577	
52	-0.0027483	-0.0442774	
53	-0.0036380	-0.0430288	
54	-0.0052670	-0.0415040	
55	-0.0086063	-0.0399835	
56	0.0213758	-0.0429305	
57	0.0062328	-0.0411895	
58	0.0006810	-0.0403878	
59	-0.0018741	-0.0400741	
60	-0.0032008	-0.0396865	
61	0.0227431	-0.0313322	
62	0.0118587	-0.0317091	
63	0.0035774	-0.0331105	
64	-0.0001942	-0.0345228	
65	-0.0022619	-0.0353916	
66	-0.0034455	-0.0358011	
67	-0.0047612	-0.0360284	
68	-0.0079154	-0.0356759	
69	-0.0144100	-0.0346796	

70	0.0225387	-0.0188639
71	0.0077938	-0.0237141
72	0.0024590	-0.0275978
73	-0.0005807	-0.0300431
74	-0.0024942	-0.0315964
76	0.0189078	-0.0079244
77	0.0132005	-0.0125230
78	0.0062288	-0.0195015
79	0.0019265	-0.0238077
80	-0.0008018	-0.0265807
81	-0.0028015	-0.0284307
82	-0.0064494	-0.0298929
83	-0.0117968	-0.0299577
85	0.0190404	-0.0033346
86	0.0109577	-0.0110445
87	0.0052975	-0.0170352
88	0.0015493	-0.0210741
89	-0.0010642	-0.0227642
91	0.0154897	-0.0047404
92	0.0092718	-0.0104810
93	0.0045432	-0.0153991
94	0.0011306	-0.0189469
95	-0.0015045	-0.0212932
96	-0.0038958	-0.0228307
97	-0.0090745	-0.0243627
98	-0.0169539	-0.0244251
100	0.0172868	-0.0015474
101	0.0129763	-0.0056095
102	0.0079076	-0.0101257
103	0.0038067	-0.0141375
104	0.0005602	-0.0171654
106	0.0151087	-0.0026747
107	0.0110416	-0.0061170
108	0.0067142	-0.0097310
109	0.0030455	-0.0130342
110	-0.0001714	-0.0156253
111	-0.0059094	-0.0182334
112	-0.0126721	-0.0192015
114	0.0158317	-0.0010112
115	0.0132463	-0.0034201
116	0.0094229	-0.0063096
117	0.0055969	-0.0091837
118	0.0021505	-0.0118802
120	0.0143812	-0.0018131
121	0.0115799	-0.0038044
122	0.0079854	-0.0062810
123	0.0045606	-0.0085964
124	0.0010143	-0.0105650
125	-0.0021359	-0.0121062
126	-0.0087600	-0.0139566
127	-0.0167630	-0.0145021
129	0.0139171	-0.0010786
130	0.0087788	-0.0039485
131	0.0020161	-0.0071298
132	-0.0048049	-0.0090119
133	-0.0121351	-0.0099241
135	0.0115606	-0.0012713
136	0.0060142	-0.0031196
137	-0.0008501	-0.0048125
138	-0.0079830	-0.0057941
139	-0.0154004	-0.0062804
141	0.0128448	-0.0001212
142	0.0090729	-0.0006699
143	0.0030023	-0.0015174
144	-0.0040203	-0.0022120
145	-0.0112633	-0.0026360

147	0.0110356	0.0005305
148	0.0062665	0.0007363
149	-0.0002597	0.0006706
150	-0.0073801	0.0005859
151	-0.0142594	0.0003946
153	0.0120764	0.0007599
154	0.0087392	0.0020513
155	0.0031270	0.0029073
156	-0.0037107	0.0033504
157	-0.0107189	0.0034981
159	0.0103844	0.0025152
160	0.0059458	0.0045206
161	-0.0002829	0.0058091
162	-0.0072030	0.0064241
163	-0.0139429	0.0065412
165	0.0111840	0.0020287
166	0.0080533	0.0055029
167	0.0027483	0.0080013
168	-0.0038147	0.0093478
169	-0.0105909	0.0097472
170	-0.0139173	0.0097727

LOADING - EIGHT

X=0.80

RESULTANT JOINT DISPLACEMENTS - SUPPORTS

JOINT	/-----DISPLACEMENT-----/		
	X DISP.	Y DISP.	Z DISP.
1	0.0	-0.0807962	
2	0.0	-0.0790533	
3	0.0	-0.0763665	
4	0.0	-0.0741071	
5	0.0	-0.0712178	
6	0.0	-0.0688545	
7	0.0	-0.0661774	
9	0.0	-0.0618479	
8	0.0	-0.0640514	
10	0.0	-0.0601981	
11	0.0	-0.0577008	
12	0.0	-0.0551482	
13	0.0	-0.0538174	
14	0.0	-0.0519676	
15	0.0	-0.0510186	
75	0.0277750	0.0	
84	0.0239656	0.0	
90	0.0222605	0.0	
99	0.0202982	0.0	
105	0.0192304	0.0	
113	0.0180901	0.0	
119	0.0174391	0.0	
128	0.0162735	0.0	
134	0.0158172	0.0	
140	0.0149156	0.0	
146	0.0145973	0.0	
152	0.0138526	0.0	
158	0.0136425	0.0	
164	0.0127935	0.0	

RESULTANT JOINT DISPLACEMENTS - FREE JOINTS

X DISP.

Y DISP.

Z DISP.

16	0.0036757	-0.0802691
17	0.0015474	-0.0757558
18	0.0002278	-0.0704663
19	-0.0004611	-0.0653899
20	-0.0007305	-0.0610568
21	0.0072530	-0.0783984
22	0.0048598	-0.0765101
23	0.0015088	-0.0713930
24	-0.0003821	-0.0662103
25	-0.0012618	-0.0616538
26	-0.0016032	-0.0579004
27	-0.0021623	-0.0534027
28	-0.0034654	-0.0506807
29	0.0107303	-0.0757703
30	0.0042785	-0.0711986
31	0.0005212	-0.0660436
32	-0.0013523	-0.0614167
33	-0.0021527	-0.0576616
34	0.0142068	-0.0716805
35	0.0090584	-0.0696499
36	0.0025705	-0.0646313
37	-0.0008143	-0.0600601
38	-0.0023234	-0.0564328
39	-0.0028940	-0.0537260
40	-0.0035497	-0.0518696
41	-0.0050498	-0.0488582
42	-0.0092299	-0.0466780
43	0.0174647	-0.0665018
44	0.0061568	-0.0617470
45	0.0005668	-0.0573312
46	-0.0019904	-0.0540425
47	-0.0030971	-0.0516240
48	0.0205746	-0.0594158
49	0.0117946	-0.0571312
50	0.0030344	-0.0529187
51	-0.0009878	-0.0502662
52	-0.0028036	-0.0484834
53	-0.0038249	-0.0470392
54	-0.0056687	-0.0453332
55	-0.0093274	-0.0436688
56	0.0229304	-0.0502379
57	0.0068698	-0.0463924
58	0.0008776	-0.0447996
59	-0.0018956	-0.0441213
60	-0.0033636	-0.0435307
61	0.0248974	-0.0378245
62	0.0125290	-0.0370283
63	0.0038082	-0.0372863
64	-0.0001770	-0.0383187
65	-0.0023902	-0.0390024
66	-0.0036817	-0.0393113
67	-0.0051256	-0.0394868
68	-0.0085849	-0.0390320
69	-0.0156351	-0.0379301
70	0.0247685	-0.0222852
71	0.0080830	-0.0272919
72	0.0025388	-0.0309755
73	-0.0006522	-0.0333223
74	-0.0026883	-0.0348258
76	0.0207142	-0.0092071
77	0.0141748	-0.0144340

78	0.0064809	-0.0221677
79	0.0019608	-0.0266163
80	-0.0009171	-0.0294457
81	-0.0030521	-0.0313257
82	-0.0070114	-0.0328041
83	-0.0128293	-0.0328291
85	0.0209594	-0.0037905
86	0.0117521	-0.0125471
87	0.0055518	-0.0191865
88	0.0015680	-0.0234774
89	-0.0012118	-0.0262932
91	0.0169462	-0.0053399
92	0.0099530	-0.0117975
93	0.0047898	-0.0172338
94	0.0011319	-0.0210503
95	-0.0016864	-0.0235438
96	-0.0042736	-0.0251698
97	-0.0098949	-0.0267718
98	-0.0184618	-0.0268126
100	0.0190203	-0.0017223
101	0.0141436	-0.0062832
102	0.0085002	-0.0113309
103	0.0040284	-0.0157562
104	0.0005303	-0.0190373
106	0.0165688	-0.0029760
107	0.0120105	-0.0068282
108	0.0072265	-0.0108493
109	0.0032291	-0.0144897
110	-0.0002554	-0.0173051
111	-0.0064767	-0.0201112
112	-0.0138322	-0.0211376
114	0.0173912	-0.0011197
115	0.0144934	-0.0038031
116	0.0102389	-0.0070281
117	0.0060289	-0.0102160
118	0.0022737	-0.0131851
120	0.0157704	-0.0020124
121	0.0126514	-0.0042290
122	0.0086712	-0.0069871
123	0.0049174	-0.0095547
124	0.0010481	-0.0117214
125	-0.0023805	-0.0134082
126	-0.0095897	-0.0154177
127	-0.0183214	-0.0159970
129	0.0152600	-0.0011962
130	0.0095724	-0.0043962
131	0.0021566	-0.0079276
132	-0.0052848	-0.0099987
133	-0.0132856	-0.0109919
135	0.0126594	-0.0014211
136	0.0065545	-0.0034901
137	-0.0009631	-0.0053743
138	-0.0087570	-0.0064587
139	-0.0168797	-0.0069853
141	0.0140824	-0.0001427
142	0.0099295	-0.0007726
143	0.0032649	-0.0017331
144	-0.0044247	-0.0025140
145	-0.0123539	-0.0029828
147	0.0120949	0.0005617
148	0.0068553	0.0007626
149	-0.0003020	0.0006682
150	-0.0081030	0.0005640
151	-0.0156514	0.0003541
153	0.0132433	0.0008246
154	0.0095762	0.0022213

155	0.0034167	0.0031399	72
156	-0.0040810	0.0036108	
157	-0.0117663	0.0037679	
159	0.0113873	0.0027419	
160	0.0065137	0.0049233	
161	-0.0003199	0.0063205	
162	-0.0079100	0.0069859	
163	-0.0153073	0.0071133	
165	0.0122690	0.0022180	
166	0.0088304	0.0060121	
167	0.0030079	0.0087350	
168	-0.0041921	0.0101594	
169	-0.0116281	0.0106335	
170	-0.0152794	0.0106614	

LOADING - NINE

X=0.90

RESULTANT JOINT DISPLACEMENTS - SUPPORTS

JOINT	/-----DISPLACEMENT-----/		
	X DISP.	Y DISP.	Z DISP.
1	0.0	-0.0841545	
2	0.0	-0.0824316	
3	0.0	-0.0797706	
4	0.0	-0.0775282	
5	0.0	-0.0746502	
6	0.0	-0.0722896	
7	0.0	-0.0695996	
9	0.0	-0.0652233	
8	0.0	-0.0674580	
10	0.0	-0.0635481	
11	0.0	-0.0609992	
12	0.0	-0.0583606	
13	0.0	-0.0569868	
14	0.0	-0.0550510	
15	0.0	-0.0540548	
75	0.0302705	0.0	
84	0.0258738	0.0	
90	0.0239321	0.0	
99	0.0217545	0.0	
105	0.0205751	0.0	
113	0.0193256	0.0	
119	0.0186135	0.0	
128	0.0173509	0.0	
134	0.0168568	0.0	
140	0.0158906	0.0	
146	0.0155504	0.0	
152	0.0147997	0.0	
158	0.0145350	0.0	
164	0.0136320	0.0	

RESULTANT JOINT DISPLACEMENTS - FREE JOINTS

JOINT	/-----DISPLACEMENT-----/		
	X DISP.	Y DISP.	Z DISP.
16	0.0037537	-0.0836365	
17	0.0016388	-0.0791713	

18	0.0003012	-0.0739101
19	-0.0004210	-0.0688158
20	-0.0007224	-0.0644237
21	0.0074126	-0.0817914
22	0.0050422	-0.0799242
23	0.0016798	-0.0748461
24	-0.0022717	-0.0696536
25	-0.0012221	-0.0650369
26	-0.0016200	-0.0611954
27	-0.0022552	-0.0565535
28	-0.0036479	-0.0537086
29	0.0109728	-0.0792110
30	0.0045612	-0.0746767
31	0.0007314	-0.0695162
32	-0.0012527	-0.0648162
33	-0.0021499	-0.0609569
34	0.0145382	-0.0751960
35	0.0094492	-0.0731823
36	0.0029072	-0.0681629
37	-0.0006292	-0.0634915
38	-0.0022802	-0.0597195
39	-0.0029500	-0.0568950
40	-0.0036745	-0.0549588
41	-0.0053095	-0.0518048
42	-0.0097208	-0.0495065
43	0.0179130	-0.0701668
44	0.0066437	-0.0653920
45	0.0008635	-0.0608286
46	-0.0018942	-0.0573225
47	-0.0031283	-0.0547443
48	0.0211788	-0.0632734
49	0.0124461	-0.0609845
50	0.0034708	-0.0565437
51	-0.0008317	-0.0535416
52	-0.0028065	-0.0515454
53	-0.0039339	-0.0499601
54	-0.0059455	-0.0481227
55	-0.0098376	-0.0463546
56	0.0238381	-0.0545971
57	0.0074767	-0.0502518
58	0.0010890	-0.0480616
59	-0.0018681	-0.0471005
60	-0.0034523	-0.0463518
61	0.0260213	-0.0433790
62	0.0132820	-0.0413265
63	0.0040493	-0.0404842
64	-0.0001226	-0.0411661
65	-0.0024541	-0.0416824
66	-0.0038333	-0.0419017
67	-0.0053743	-0.0420305
68	-0.0090598	-0.0414922
69	-0.0165049	-0.0403114
70	0.0261355	-0.0267869
71	0.0083094	-0.0302350
72	0.0026188	-0.0335922
73	-0.0006839	-0.0358001
74	-0.0028130	-0.0372345
75	0.0218859	-0.0106592
76	0.0146449	-0.0163747
77	0.0066253	-0.0243548
78	0.0019827	-0.0287980
79	-0.0009947	-0.0316172
80	-0.0032259	-0.0334905
81	-0.0074124	-0.0349589
82	-0.0135693	-0.0349467
83	0.0223667	-0.0042259

87	0.0056917	-0.0209302
88	0.0015682	-0.0253405
89	-0.0013210	-0.0282116
91	0.0179783	-0.0058761
92	0.0103605	-0.0129302
93	0.0049294	-0.0186998
94	0.0011162	-0.0226749
95	-0.0018241	-0.0252524
96	-0.0045500	-0.0269287
97	-0.0104884	-0.0285654
98	-0.0195474	-0.0285846
100	0.0203286	-0.0018647
101	0.0149572	-0.0068549
102	0.0088730	-0.0122252
103	0.0041568	-0.0170336
104	0.0004923	-0.0204780
106	0.0176457	-0.0032201
107	0.0126823	-0.0074120
108	0.0075581	-0.0117485
109	0.0033358	-0.0156276
110	-0.0003319	-0.0185933
111	-0.0068947	-0.0215281
112	-0.0146756	-0.0225887
114	0.0185582	-0.0012042
115	0.0154005	-0.0041098
116	0.0108048	-0.0076059
117	0.0063129	-0.0110332
118	0.0023419	-0.0141988
120	0.0167982	-0.0021694
121	0.0134248	-0.0045660
122	0.0091470	-0.0075469
123	0.0051540	-0.0103069
124	0.0010555	-0.0126179
125	-0.0025718	-0.0144080
126	-0.0102001	-0.0165268
127	-0.0194596	-0.0171260
129	0.0162520	-0.0012873
130	0.0101389	-0.0047506
131	0.0022428	-0.0085508
132	-0.0056457	-0.0107605
133	-0.0141324	-0.0118100
135	0.0134652	-0.0015402
136	0.0069390	-0.0037859
137	-0.0010578	-0.0058181
138	-0.0093324	-0.0069791
139	-0.0179729	-0.0075351
141	0.0149964	-0.0001613
142	0.0105553	-0.0008599
143	0.0034482	-0.0019133
144	-0.0047308	-0.0027625
145	-0.0131633	-0.0022651
147	0.0128752	0.0005790
148	0.0072836	0.0007689
149	-0.0003411	0.0006468
150	-0.0086430	0.0005253
151	-0.0166868	0.0003018
153	0.0141055	0.0008702
154	0.0101915	0.0023391
155	0.0036247	0.0032979
156	-0.0043608	0.0037850
157	-0.0125465	0.0039478
159	0.0121275	0.0029051
160	0.0069296	0.0052115
161	-0.0003527	0.0066842
162	-0.0084386	0.0073842

163	-0.0163232	0.0075189
165	0.0130718	0.0023564
166	0.0094032	0.0063828
167	0.0031958	0.0092666
168	-0.0044763	0.0108141
169	-0.0124014	0.0112727
170	-0.0162938	0.0113022

APPENDIX 2

Elliptic slit , 'LST' type .

The following presents :

- 1- Plate division , the numbers are node names , page 77 .
- 2- Input data , pp 78 - 97 .
- 3 -Output data , pp 98 - 121

THEORY

1. The first part of the theory is the

the second part of the theory is the

the third part of the theory is the

the fourth part of the theory is the

the fifth part of the theory is the

2	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
1	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200																				
2	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200																				
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4	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200																				
5	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200																				
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APPENDIX 2 ELLIPTIC SLITS

ELECT TYPE

TYPE PLANE STRESS

UNITS INCHES

UNITS POUNDS

JOINT COORDINATES

1 .0 .1 5

106 5

2 .0 .2 5

107 5

3 .0 .25 5

108 5

4 .0 .55 5

109 5

5 .0 .8 5

110 5

6 .0 1.1 5

111 5

7 .0 1.5 5

112 5

8 .0 2. 5

113

114

115

116

9 .1 .0006

117

10 .1 .2

118

119

120

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123

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125

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127

128

129

130

131

11 .2 .098

132

12 .2 .35

133

13 .2 .55

134

14 .2 .8

135

15 .2 1.1

136

16 .2 1.5

137

17 .2 2.

138

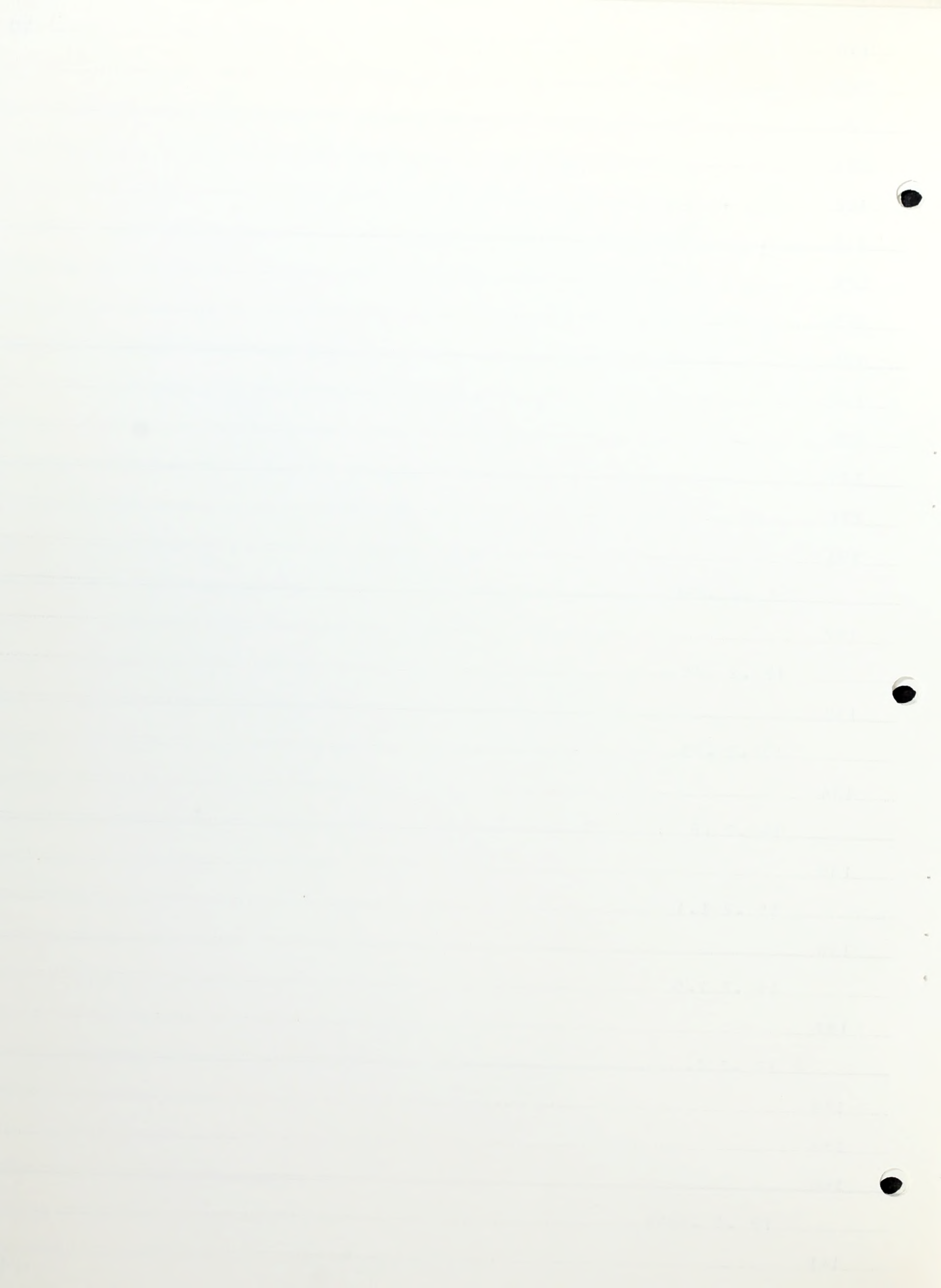
139

140

18 .3 .0955

141

19 .2 .2



142

143

144

145

146

147

148

149

150

151

152

153

154

155

20 .4 .0917

156

21 .4 .35

157

22 .4 .55

158

23 .4 .8

159

24 .4 1.1

160

25 .4 1.5

161

26 .4 2.

162

163

164

27 .5 .0866

165

28 .5 .2

166

167

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169

170

171

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175

176

177

178

179

29 .6 .08

180

30 .6 .35

181

31 .6 .55

182

32 .6 .8

183

23 .6 1.1

184

34 .6 1.5

185

35 .6 2.

186

187

188

36 .7 .0714

189

37 .7 .2

190

191

192

193

194

195

196

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199

200

201

202

203

38 .8 .06

204

39 .8 .35

205

40 .8 .55

206

41 .8 .8

207

42 .8 1.1

208

43 .8 1.5

209

44 .8 2.

210

211

212

45 .9 .0436

224

46 .9 .2

213

214

215

216

217

218

219

220

221

222

223

225

226

227

228

47 1. . C S

229

48 1. . 1

230

49 1. . 35

231

50 1. . 55

232

51 1. . 8

233

52 1. 1. 1

234

53 1. 1. 5

235

54 1. 2.

236 S

237

238

239

241

55 1.1 .0 S

242

56 1.1 .1

243

57 1.1 .2

244

245

246

247

248

249

250

251

252

253

254

255 S

256

257

258

259

58 1.25 .0 S

260

59 1.25 .2

261

60 1.25 .35

262

61 1.25 .55

263

62 1.25 .8

264

265

64 1.25 1.5

266

65 1.25 2.

267 S

268

269

270

271

272

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275

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278

279

280

281

66 1.45 .0 S

282

67 1.45 .2

283

68 1.45 .35

284

69 1.45 .55

285

70 1.45 .8

286

71 1.45 1.1

287

72 1.45 1.5

73 1.45 2.

289 S

290

291

292

293

294

295

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297

298

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300

301

302

303

74 1.7 .0 S

304

75 1.7 .2

305

76 1.7 .35

306

77 1.7 .55

307

78 1.7 .8

308

79 1.7 1.1

309

80 1.7 1.5

310

81 1.7 2.

311 S

312

313

314

315

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317

318

319

320

321

322

323

324

325

82 2. .0 S

326

83 2. .2

327

84 2. .35

328

85 2. .55

329

86 2. .8

330

87 2. 1.1

331

88 2. 1.5

332

89 2. 2.

333 S

334

335

347

336

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338

339

340

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342

343

344

345

346

90 2.4 .0 S

348

91 2.4 .2

349

92 2.4 .35

350

93 2.4 .55

351

94 2.4 .8

352

95 2.4 1.1

353

96 2.4 1.5

354

97 2.4 2.

355 S

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369

98 3. .0 5

370

99 3. .2

371

100 2. .35

372

101 3. .55

373

102 3. .8

374

103 2. 1.1

375

104 2. 1.5

240

105 2. 2.

ELEMENT INCIDENCES

1 1 10 2 114 115 166

2 1 9 10 113 117 116

3 9 11 10 129 130 117

4 11 15 10 139 132 130

5 11 18 19 139 141 139

6 18 20 19 153 154 141

7 20 28 19 163 156 154

8 20 27 28 162 165 163

9 27 29 28 177 178 165

10 25 37 28 187 190 177

11 29 36 37 186 189 187

12 36 38 37 201 202 189

13 38 46 37 211 204 202

14 38 45 46 210 224 211

15 45 48 46 226 227 224

16 45 47 43 225 229 226

17 46 48 57 227 239 230

18 48 56 57 235 243 239

19 48 47 56 229 237 238

20 47 55 56 236 242 237

21 2 10 3 115 116 107

22 3 10 12 116 131 118

23 10 12 12 132 140 131

24 19 21 12 155 142 140

25 19 28 21 156 164 155

26 28 30 21 179 166 164

27 28 37 30 180 188 179

28 37 39 30 203 190 188

29 37 46 39 204 212 203

30 46 49 39 223 213 212

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33 57 59 60 258 261 259

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36 56 55 58 242 255 256

37 3 13 4 119 120 108

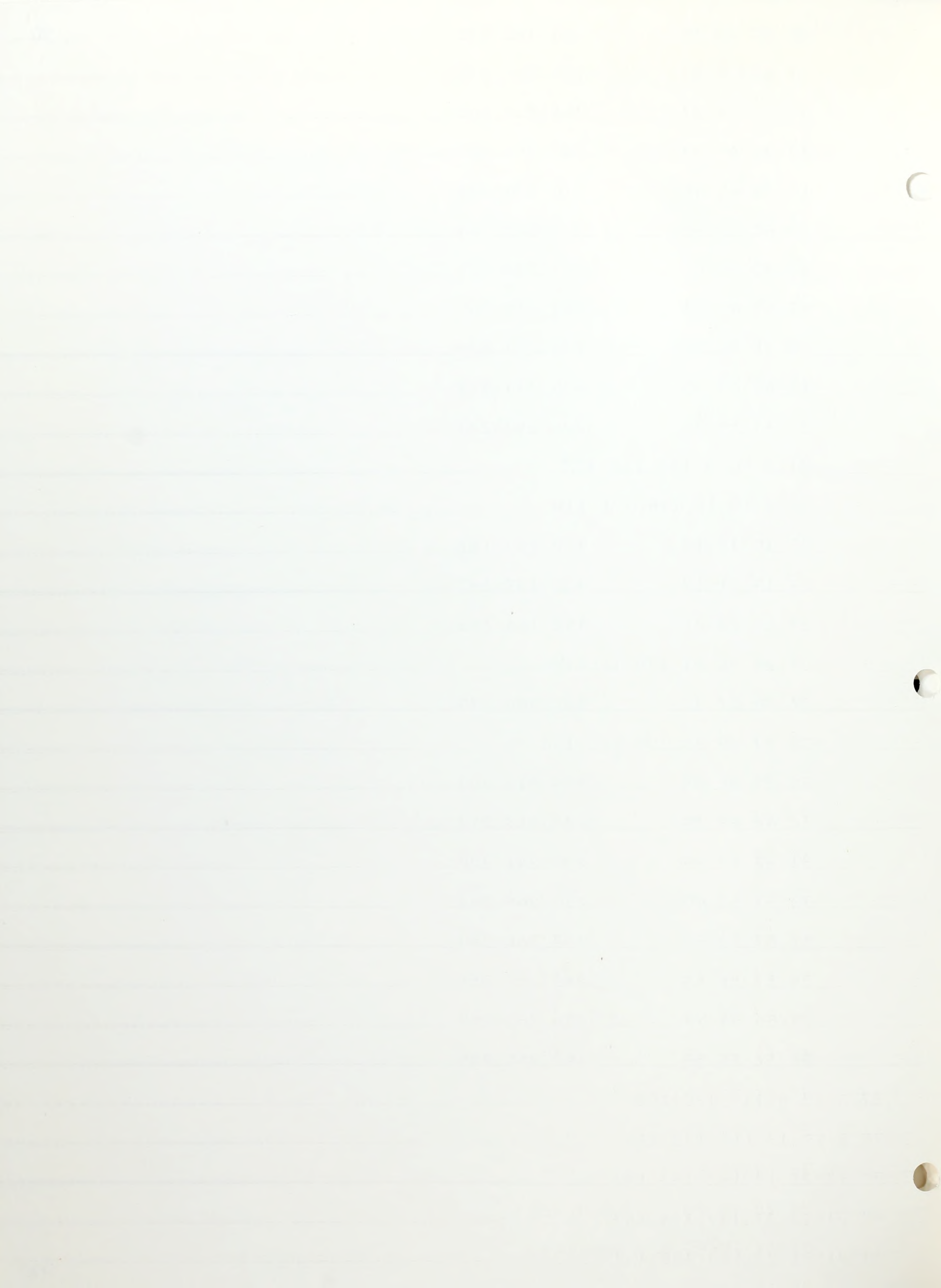
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40 21 22 13 157 144 143

41 21 31 22 167 168 157

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43 31 30 39 131 100 1 1

44 39 40 31 205 192 191

45 39 50 40 214 215 225

46 39 49 50 213 231 214

47 49 60 50 244 245 231

48 60 61 52 262 246 245

49 61 60 62 262 272 273

50 60 68 69 271 284 272

51 60 67 63 270 283 271

52 60 59 67 261 269 270

53 59 58 67 260 268 269

54 58 66 67 267 282 268

55 4 13 5 120 121 109

56 12 14 5 134 122 121

57 13 23 14 145 146 134

58 12 22 23 144 153 145

59 22 21 23 168 169 158

60 31 32 23 182 170 169

61 31 41 32 193 194 182

62 31 40 41 192 206 193

63 40 50 41 215 216 206

64 50 51 41 232 217 216

65 50 62 51 247 243 232

66 50 61 62 246 253 247

67 61 69 62 273 274 263

68 62 69 70 274 285 275

69 69 78 70 296 297 285

70 69 77 78 295 307 296

71 76 77 69 306 295 224

72 68 76 69 293 294 284

73 67 76 68 292 293 283

74 67 75 75 291 305 292

75 67 74 75 290 304 291

76 66 14 67 289 290 292

77 5 15 6 123 124 110

78 5 14 15 122 135 123

79 14 23 15 146 147 125

80 15 23 24 147 159 148

81 24 23 33 159 171 172

82 23 32 33 170 193 171

83 32 32 41 183 194 195

84 33 41 42 195 207 196

85 42 41 52 207 218 219

86 41 51 52 217 233 218

87 52 51 62 233 243 249

88 52 62 63 249 264 250

89 62 71 63 276 277 264

90 62 70 71 275 286 276

91 70 78 71 297 298 296

92 71 78 79 298 308 299

93 79 78 87 308 320 321

94 78 86 87 319 330 320

95 78 85 86 318 329 319

96 77 85 77 317 318 307

97 76 85 77 316 317 306

98 76 84 85 315 328 316

99 76 83 84 314 327 315

100 75 83 76 313 314 305

101 75 74 83 304 312 313

102 74 82 83 311 226 312

103 6 15 7 124 125 111

104 7 15 16 125 136 126

105 15 25 16 149 150 136

106 15 24 25 148 160 149

107 24 33 25 172 173 160

108 25 32 34 173 184 174

109 33 43 34 197 198 184

110 33 42 43 196 205 197

111 43 42 52 208 219 230

112 43 52 53 221 234 221

113 52 64 53 251 252 234

114 52 63 64 250 265 251

115 63 71 64 277 278 265

116 64 71 72 273 287 279

117 71 80 72 300 301 287

118 71 79 80 292 309 300

119 79 87 80 321 322 309

120 80 87 88 322 331 323

121 88 87 96 331 343 344

122 87 95 96 342 353 343

123 87 94 95 341 352 342

124 96 94 87 340 341 330

125 85 94 86 339 340 329

126 85 93 94 338 351 339

127 85 92 93 337 350 338

128 84 92 85 336 337 328

129 84 83 92 327 347 336

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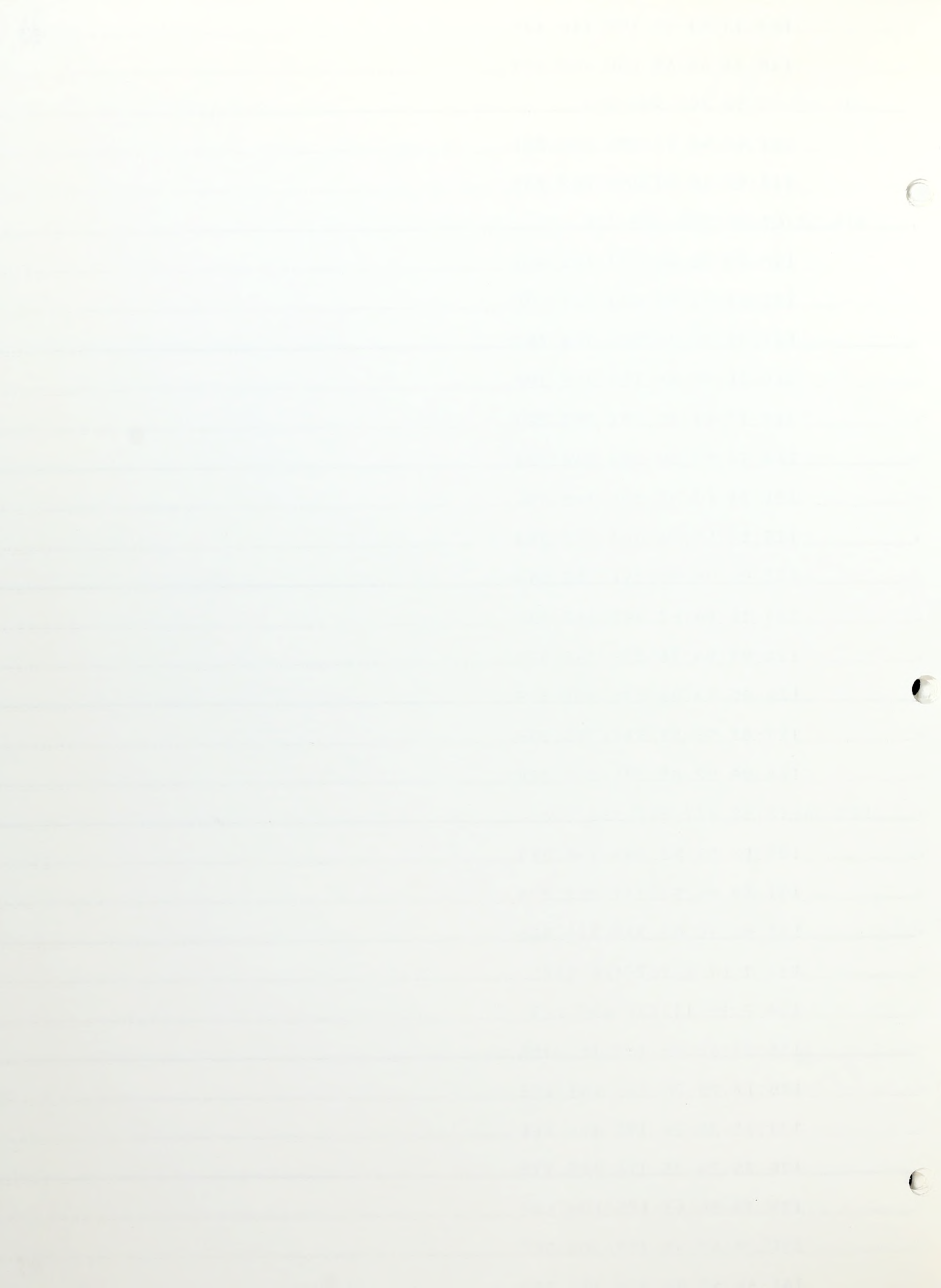
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141 44 43 54 209 222 223



142 43 53 54 221 235 222

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145 65 64 73 266 280 281

146 64 72 73 278 288 280

147 73 72 80 283 301 302

148 73 80 81 302 311 303

149 81 80 89 310 324 325

150 80 88 89 323 332 324

151 89 88 96 332 344 345

152 89 96 97 345 354 346

153 97 96 105 354 368 369

154 96 104 105 367 240 368

155 96 103 104 366 275 367

156 96 95 103 353 365 366

157 95 94 103 352 364 365

158 94 102 103 363 274 364

159 94 101 102 362 373 363

160 94 93 101 351 361 362

161 93 92 101 350 360 361

162 92 100 101 359 372 360

163 92 99 100 358 371 359

164 92 91 99 349 357 358

165 91 90 99 348 356 357

166 90 98 99 355 370 356

ELEMENT PROPERTIES

1 TO 166 TYPE 'LST' THICKNESS .2

CONSTANTS

E 30000. ALL

POISSON .3 ALL

JOINT RELEASES

1 TO 8 109 TO 112 FORCE Y

47 55 58 65 74 82 90 98 236 255 267 280 311 333 355 FORCE X



LOADING 'TWO' 'R=0.2'

JOINT LOADS

1 FORCE Y = 5.0

113 FORCE Y = -10.0

9 FORCE Y = -10.0

129 FORCE Y = -10.0

11 FORCE Y = 5.0

LOADING 'FOUR' 'R=0.4'

JOINT LOADS

1 FORCE Y = 5.0

113 FORCE Y = -10.0

9 FORCE Y = -10.0

129 FORCE Y = -10.0

11 FORCE Y = -10.0

138 FORCE Y = -10.0

18 FORCE Y = -10.0

153 FORCE Y = -10.0

20 FORCE Y = 5.0

LOADING 'SIX' 'R=0.6'

JOINT LOADS

1 FORCE Y = 5.0

113 FORCE Y = -10.0

9 FORCE Y = -10.0

129 FORCE Y = -10.0

11 FORCE Y = -10.0

138 FORCE Y = -10.0

18 FORCE Y = -10.0

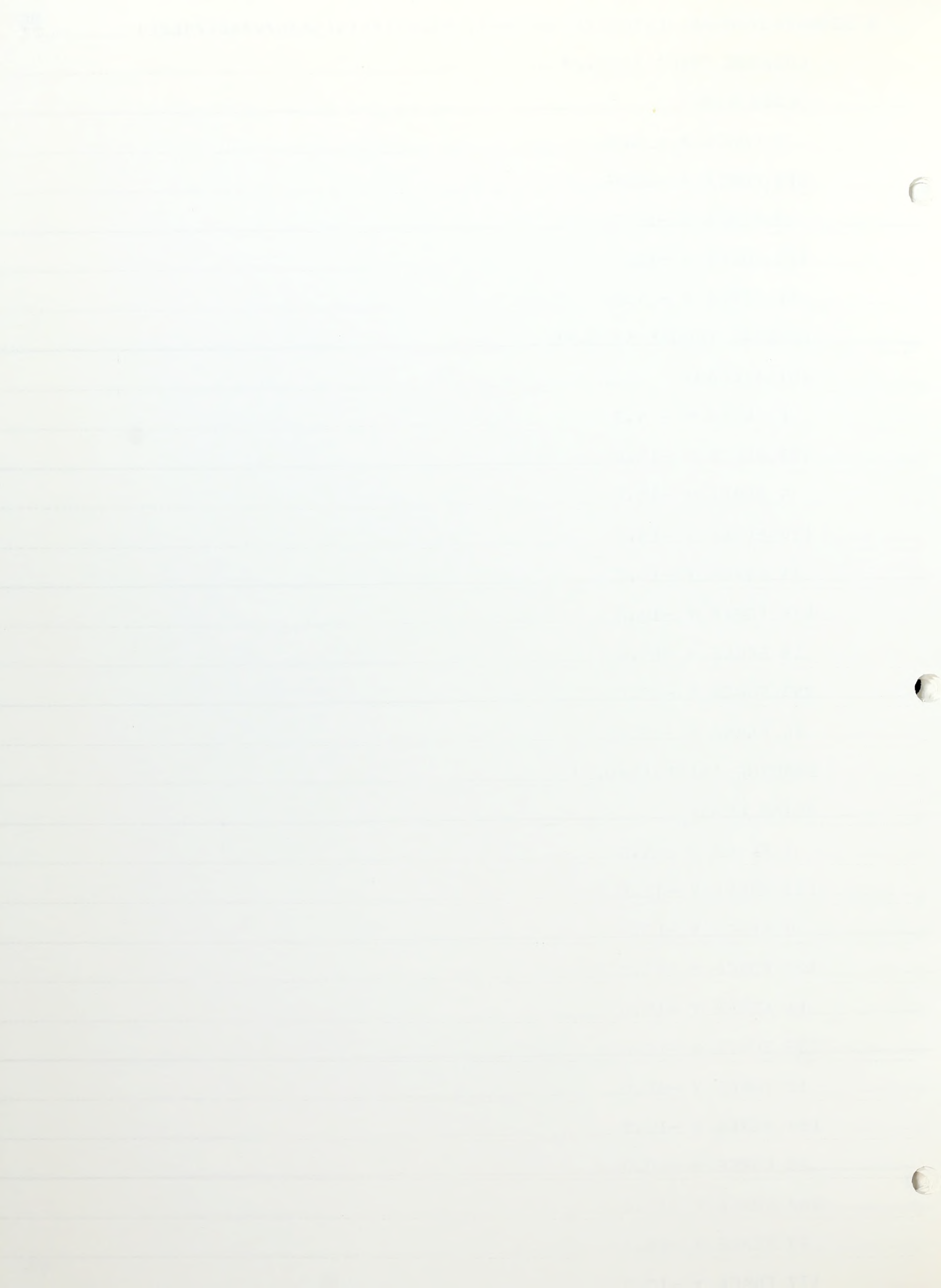
153 FORCE Y = -10.0

20 FORCE Y = -10.0

162 FORCE Y = -10.0

27 FORCE Y = -10.0

177 FORCE Y = -10.0



29 FORCE Y - 5.0

96

LOADING 'LIGHT' '0.0'

JOINT LEADS

1 FORCE Y - 5.0

113 FORCE Y - 10.0

9 FORCE Y - 10.0

129 FORCE Y - 10.0

11 FORCE Y - 10.0

138 FORCE Y - 10.0

18 FORCE Y - 10.0

153 FORCE Y - 10.0

20 FORCE Y - 10.0

162 FORCE Y - 10.0

27 FORCE Y - 10.0

177 FORCE Y - 10.0

29 FORCE Y - 10.0

186 FORCE Y - 10.0

36 FORCE Y - 10.0

201 FORCE Y - 10.0

38 FORCE Y - 5.0

STIFFNESS ANALYSIS 5

LIST DISPLACEMENTS STRESSES ALL

LEADING - TWO

SEC. 2

RESULTANT JOINT DISPLACEMENTS - SUPPORTS

JOINT	/-----DISPLACEMENT-----/		
	X DISP.	Y DISP.	Z DISP.
1	0.0	-0.0256535	
106	0.0	-0.0255622	
2	0.0	-0.0249852	
107	0.0	-0.0235650	
3	0.0	-0.0220893	
108	0.0	-0.0203728	
4	0.0	-0.0189739	
109	0.0	-0.0175866	
5	0.0	-0.0164598	
110	0.0	-0.0154245	
6	0.0	-0.0146294	
111	0.0	-0.0138556	
7	0.0	-0.0133155	
112	0.0	-0.0128731	
8	0.0	-0.0124225	
47	0.0066792	0.0	
236	0.0061271	0.0	
55	0.0056996	0.0	
255	0.0053390	0.0	
58	0.0050430	0.0	
267	0.0047423	0.0	
66	0.0045081	0.0	
289	0.0042864	0.0	
74	0.0040974	0.0	
311	0.0039203	0.0	
82	0.0037762	0.0	
333	0.0036206	0.0	
90	0.0034895	0.0	
355	0.0033330	0.0	
98	0.0031262	0.0	

RESULTANT JOINT DISPLACEMENTS - FREE JOINTS

JOINT	/-----DISPLACEMENT-----/		
	X DISP.	Y DISP.	Z DISP.
113	0.0012142	-0.0266964	
114	0.0009819	-0.0258106	
115	0.0005020	-0.0248779	
116	0.0001109	-0.0233580	
9	0.0027458	-0.0270476	
117	0.0016601	-0.0256651	
10	0.0008243	-0.0243080	
118	-0.0001401	-0.0213735	
119	-0.0002699	-0.0198949	
120	-0.0002960	-0.0186269	
121	-0.0003219	-0.0173294	
122	-0.0003227	-0.0162827	

123	-0.0012964	-0.0192834
124	-0.0012731	-0.0145150
125	-0.0012960	-0.0137693
126	-0.0013129	-0.0132495
127	-0.0014168	-0.0127958
128	-0.0016302	-0.0123750
129	0.0014132	-0.0124594
130	0.0022828	-0.0237074
131	0.0002421	-0.0216509
11	0.0053714	-0.0213803
132	0.0014705	-0.0209835
12	-0.0002273	-0.0195637
133	-0.0003916	-0.0185908
13	-0.0015300	-0.0176526
134	-0.0015623	-0.0166079
14	-0.0005775	-0.0157304
135	-0.0005665	-0.0148683
15	-0.0005431	-0.0141797
136	-0.0005508	-0.0135076
16	-0.0006139	-0.0130265
137	-0.0008229	-0.0125865
17	-0.0012470	-0.0122118
138	0.0056260	-0.0189865
139	0.0034577	-0.0129576
140	0.0007237	-0.0188605
18	0.0053836	-0.0172349
141	0.0037650	-0.0172293
19	0.0023987	-0.0173418
142	0.0002917	-0.0172606
143	-0.0002641	-0.0167521
144	-0.0005498	-0.0162472
145	-0.0007073	-0.0155444
146	-0.0007565	-0.0148843
147	-0.0007682	-0.0142097
148	-0.0007666	-0.0136541
149	-0.0007966	-0.0130766
150	-0.0008957	-0.0126560
151	-0.0012081	-0.0122699
152	-0.0018341	-0.0118922
153	0.0053534	-0.0158973
154	0.0040098	-0.0159354
155	0.0014359	-0.0161135
20	0.0053641	-0.0147463
156	0.0030213	-0.0148525
21	0.0007824	-0.0149906
157	0.0000114	-0.0148748
22	-0.0004379	-0.0146446
158	-0.0007242	-0.0142547
23	-0.0008479	-0.0138368
159	-0.0009000	-0.0133612
24	-0.0009357	-0.0129524
160	-0.0010090	-0.0125042
25	-0.0011493	-0.0121569
161	-0.0015679	-0.0118352
26	-0.0023834	-0.0114759
162	0.0054351	-0.0137148
163	0.0042805	-0.0137352
164	0.0019840	-0.0138891
27	0.0055095	-0.0127398
165	0.0044265	-0.0127628
28	0.0034024	-0.0128102
166	0.0012338	-0.0129664
167	0.0003400	-0.0130163
168	-0.0002344	-0.0129815
169	-0.0006321	-0.0128377
170	-0.0008408	-0.0126416

171	-0.0011707	-0.0123783
172	-0.0012497	-0.0121130
173	-0.0011707	-0.0116171
174	-0.0013746	-0.0115629
175	-0.0018957	-0.0112874
176	-0.0128722	-0.0109843
177	0.0056150	-0.0118047
178	0.0045663	-0.0118269
179	0.0023556	-0.0119358
29	0.0057123	-0.0108885
180	0.0036687	-0.0109346
30	0.0015666	-0.0111044
181	0.0006545	-0.0112271
21	0.0000168	-0.0113269
182	-0.0004721	-0.0113856
32	-0.0007640	-0.0113778
183	-0.0009655	-0.0113073
33	-0.0011056	-0.0111998
184	-0.0012873	-0.0110389
34	-0.0015616	-0.0108762
185	-0.0021847	-0.0106600
35	-0.0033068	-0.0104127
186	0.0058236	-0.0099685
187	0.0046624	-0.0099784
188	0.0025908	-0.0100836
36	0.0059215	-0.0090385
189	0.0047501	-0.0090487
37	0.0037082	-0.0090712
190	0.0018123	-0.0092955
191	0.0009267	-0.0095111
192	0.0002828	-0.0097220
193	-0.0002659	-0.0099430
194	-0.0006255	-0.0100946
195	-0.0009012	-0.0101928
196	-0.0011034	-0.0102254
197	-0.0013669	-0.0101970
198	-0.0017109	-0.0101203
199	-0.0024290	-0.0099737
200	-0.0036722	-0.0097632
201	0.0060394	-0.0080775
202	0.0048364	-0.0080823
203	0.0027315	-0.0082304
38	0.0061324	-0.0070630
204	0.0037182	-0.0071261
39	0.0020134	-0.0075188
205	0.0011920	-0.0078625
40	0.0005571	-0.0081845
206	-0.0000238	-0.0085439
41	-0.0004359	-0.0088342
207	-0.0007827	-0.0090765
42	-0.0010577	-0.0092268
208	-0.0014049	-0.0092185
43	-0.0018198	-0.0093221
209	-0.0026312	-0.0092371
44	-0.0039769	-0.0090749
210	0.0062176	-0.0059315
211	0.0047035	-0.0059608
212	0.0028384	-0.0063454
45	0.0062444	-0.0046661
224	0.0047396	-0.0047498
46	0.0037057	-0.0050556
213	0.0022347	-0.0058037
214	0.0014704	-0.0062952
215	0.0003474	-0.0067471
216	0.0002700	-0.0072349
217	-	-0.0076303

218	-0.0006238	-0.0009883
219	-0.0009752	-0.0008235
220	-0.0014612	-0.0008427
221	-0.0018966	-0.0008500
222	-0.0027912	-0.0008472
223	-0.0042045	-0.0008354
225	0.0044448	-0.0002977
226	0.0054130	-0.0003177
227	0.0043149	-0.0003672
228	0.0030104	-0.0004241
229	0.0056905	-0.0001237
48	0.0049628	-0.0002121
230	0.0038510	-0.0003141
49	0.0025169	-0.0004266
231	0.0017832	-0.0004900
50	0.0011673	-0.0005462
232	0.0005432	-0.0006042
51	0.0000402	-0.0006513
233	-0.0004455	-0.0006952
52	-0.0008575	-0.0007276
234	-0.0013678	-0.0007544
53	-0.0019404	-0.0007675
235	-0.0029109	-0.0007699
54	-0.0043743	-0.0007613
237	0.0057041	-0.0005965
238	0.0050742	-0.0001283
239	0.0044923	-0.0001880
241	0.0032775	-0.0003068
242	0.0055069	-0.0004158
56	0.0050732	-0.0008785
243	0.0045767	-0.0001378
57	0.0040942	-0.0001858
244	0.0028835	-0.0002860
245	0.0021855	-0.0003522
246	0.0015789	-0.0004107
247	0.0009140	-0.0004740
248	0.0003577	-0.0005266
249	-0.0001940	-0.0005766
250	-0.0006792	-0.0006142
251	-0.0012957	-0.0006481
252	-0.0019579	-0.0006660
253	-0.0030062	-0.0006722
254	-0.0044924	-0.0006701
256	0.0052200	-0.0002901
257	0.0045933	-0.0009677
258	0.0041939	-0.0001338
259	0.0035980	-0.0001890
260	0.0047932	-0.0004622
59	0.0042098	-0.0001026
261	0.0037036	-0.0001476
60	0.0031880	-0.0001935
262	0.0025220	-0.0002535
61	0.0019271	-0.0003077
263	0.0012634	-0.0003678
62	0.0006786	-0.0004202
264	0.0000593	-0.0004716
63	-0.0004937	-0.0005112
265	-0.0011863	-0.0005483
64	-0.0019366	-0.0005700
266	-0.0030500	-0.0005793
65	-0.0045333	-0.0005815
268	0.0045840	-0.0003563
269	0.0041710	-0.0007635
270	0.0037615	-0.0001112
271	0.0033213	-0.0001477
272	0.0027289	-0.0001968

273	0.001573	-0.0024477
274	0.0015009	-0.0020956
275	0.0019060	-0.0014805
276	0.002542	-0.0039749
277	-0.0007456	-0.0043687
278	-0.0011073	-0.0047396
279	-0.0017026	-0.0049625
280	-0.0030530	-0.0050840
281	-0.0045213	-0.0051182
282	0.0043969	-0.0002883
67	0.0040897	-0.0005951
283	0.0037623	-0.0008628
68	0.0033920	-0.0011483
284	0.0028681	-0.0015446
69	0.0023397	-0.0019468
285	0.0016981	-0.0024313
70	0.0011014	-0.0028669
286	0.0004327	-0.0033193
71	-0.0002014	-0.0036939
287	-0.0010179	-0.0040513
72	-0.0018565	-0.0042745
288	-0.0030344	-0.0044120
73	-0.0044742	-0.0044451
290	0.0042020	-0.0002148
291	0.0039664	-0.0004511
292	0.0037168	-0.0006430
293	0.0034183	-0.0008528
294	0.0029675	-0.0011554
295	0.0024922	-0.0014682
296	0.0018925	-0.0018561
297	0.0013023	-0.0022247
298	0.0006200	-0.0026152
299	-0.0000399	-0.0029415
300	-0.0009045	-0.0032734
301	-0.0017897	-0.0034872
302	-0.0029895	-0.0036160
303	-0.0043710	-0.0036830
304	0.0040380	-0.0001578
75	0.0038535	-0.0003339
305	0.0036480	-0.0004778
76	0.0033988	-0.0006324
306	0.0030124	-0.0008573
77	0.0025875	-0.0010933
307	0.0020285	-0.0013934
78	0.0014582	-0.0016888
308	0.0007713	-0.0020150
79	0.0000974	-0.0022914
309	-0.0007973	-0.0025792
80	-0.0017171	-0.0027745
310	-0.0029257	-0.0028873
81	-0.0042453	-0.0029758
312	0.0033721	-0.0001081
313	0.0027274	-0.0002224
314	0.0035595	-0.0003188
315	0.0033500	-0.0004236
316	0.0030205	-0.0005733
317	0.0026451	-0.0007354
318	0.0021289	-0.0009489
319	0.0015846	-0.0011616
320	0.0009128	-0.0014035
321	0.0002299	-0.0016193
322	-0.0006904	-0.0018436
323	-0.0016300	-0.0019970
324	-0.0023347	-0.0021093
325	-0.0040833	-0.0021849
326	0.0037346	-0.0000641

83	0.0036116	-0.0001304
327	0.0034767	-0.0001861
84	0.0032903	-0.0002483
328	0.0029733	-0.0003402
85	0.0026594	-0.0004414
329	0.0021818	-0.0005799
86	0.0016647	-0.0007206
330	0.0010100	-0.0008842
87	0.0003300	-0.0010359
331	-0.0006251	-0.0011976
88	-0.0015507	-0.0013145
332	-0.0027423	-0.0014038
89	-0.0039244	-0.0014629
334	0.0035853	-0.0000070
335	0.0034808	-0.0000181
347	0.0033595	-0.0000288
336	0.0032040	-0.0000430
337	0.0029469	-0.0000705
338	0.0026411	-0.0001059
339	0.0022034	-0.0001574
340	0.0017158	-0.0002162
341	0.0010809	-0.0002906
342	0.0004097	-0.0003612
343	-0.0005171	-0.0004444
344	-0.0014628	-0.0005085
345	-0.0026363	-0.0005619
346	-0.0037451	-0.0006141
348	0.0034621	0.0000467
91	0.0033700	0.0000907
349	0.0032583	0.0001212
92	0.0031139	0.0001488
350	0.0028815	0.0001813
93	0.0025999	0.0002068
351	0.0021873	0.0002301
94	0.0017199	0.0002426
352	0.0011042	0.0002490
95	0.0004483	0.0002470
353	-0.0004650	0.0002407
96	-0.0014040	0.0002282
354	-0.0025548	0.0002118
97	-0.0036138	0.0001825
356	0.0033013	0.0001404
357	0.0032132	0.0002785
358	0.0031147	0.0003790
359	0.0029860	0.0004763
360	0.0027662	0.0005002
361	0.0025004	0.0007156
362	0.0021139	0.0008456
363	0.0016707	0.0009602
364	0.0010798	0.0010758
365	0.0004422	0.0011684
366	-0.0004554	0.0012602
367	-0.0013730	0.0013178
368	-0.0024922	0.0013481
369	-0.0035401	0.0013495
370	0.0031036	0.0002684
99	0.0030287	0.0005333
371	0.0029290	0.0007269
100	0.0028025	0.0009156
372	0.0025095	0.0011536
101	0.0023524	0.0013785
373	0.0019785	0.0016221
102	0.0015546	0.0018597
374	0.0009899	0.0020837
103	0.0003714	0.0022686
375	-0.0004986	0.0024312

104	-0.001382	0.0025342
240	-0.002433	0.0025774
105	-0.0035400	0.0025791

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LOADING - FOUR R=0.4

RESULTANT JOINT DISPLACEMENTS - SUPPORTS

JOINT	DISPLACEMENT		
	X DISP.	Y DISP.	Z DISP.
1	0.0	-0.0489526	
106	0.0	-0.0489868	
2	0.0	-0.0485278	
107	0.0	-0.0471729	
3	0.0	-0.0455439	
108	0.0	-0.0432174	
4	0.0	-0.0410668	
109	0.0	-0.0386378	
5	0.0	-0.0365195	
110	0.0	-0.0344575	
6	0.0	-0.0328309	
111	0.0	-0.0312027	
7	0.0	-0.0300430	
112	0.0	-0.0290750	
8	0.0	-0.0280743	
47	0.0153397	0.0	
236	0.0139951	0.0	
55	0.0130445	0.0	
255	0.0122000	0.0	
58	0.0115082	0.0	
267	0.0108070	0.0	
66	0.0102629	0.0	
289	0.0097500	0.0	
74	0.0093139	0.0	
311	0.0089073	0.0	
82	0.0085776	0.0	
333	0.0082227	0.0	
90	0.0079247	0.0	
355	0.0075698	0.0	
98	0.0071009	0.0	

RESULTANT JOINT DISPLACEMENTS - FREE JOINTS

JOINT	DISPLACEMENT		
	X DISP.	Y DISP.	Z DISP.
113	0.0012239	-0.0501993	
114	0.0013705	-0.0493878	
115	0.0010438	-0.0485709	
116	0.0006049	-0.0470753	
9	0.0027313	-0.0511538	
117	0.0024734	-0.0497706	
10	0.0019484	-0.0484570	
118	0.0005147	-0.0449885	
119	0.0000044	-0.0427155	
120	-0.0002658	-0.0405799	
121	-0.0004667	-0.0382044	
122	-0.0005568	-0.0361795	

123	-0.0005729	-0.0341801
124	-0.0005740	-0.0325944
125	-0.0006115	-0.0310180
126	-0.0006902	-0.0298994
127	-0.0009303	-0.0289054
128	-0.0014068	-0.0279690
129	0.0042264	-0.0500944
130	0.0036582	-0.0492084
131	0.0015965	-0.0460953
132	0.0034833	-0.0469256
133	0.0008015	-0.0422766
134	-0.0000125	-0.0411026
135	-0.0005457	-0.0391069
136	-0.0008720	-0.0369698
137	-0.0010325	-0.0351567
138	-0.0011055	-0.0333551
139	-0.0011273	-0.0318981
140	-0.0011907	-0.0304578
141	-0.0013572	-0.0284148
142	-0.0018379	-0.0284456
143	-0.0027851	-0.0276083
144	0.0080208	-0.0475863
145	0.0057798	-0.0466317
146	0.0023291	-0.0435259
147	0.0097261	-0.0459815
148	0.0068554	-0.0445779
149	0.0047380	-0.0432044
150	0.0012238	-0.0400533
151	0.0000221	-0.0383382
152	-0.0007116	-0.0367795
153	-0.0011305	-0.0350405
154	-0.0014084	-0.0335309
155	-0.0015407	-0.0320202
156	-0.0016087	-0.0307956
157	-0.0017293	-0.0295315
158	-0.0019851	-0.0286065
159	-0.0027016	-0.0277485
160	-0.0040986	-0.0269028
161	0.0115342	-0.0420296
162	0.0077943	-0.0411626
163	0.0029413	-0.0301318
164	0.0131172	-0.0374220
165	0.0058460	-0.0371061
166	0.0016989	-0.0357535
167	0.0002552	-0.0347161
168	-0.0006746	-0.0337075
169	-0.0013341	-0.0325073
170	-0.0016673	-0.0314030
171	-0.0018561	-0.0302589
172	-0.0019901	-0.0293075
173	-0.0022033	-0.0282921
174	-0.0025552	-0.0275126
175	-0.0035108	-0.0267901
176	-0.0053309	-0.0259824
177	0.0130371	-0.0337817
178	0.0092932	-0.0337719
179	0.0038349	-0.0337313
180	0.0129351	-0.0308096
181	0.0093130	-0.0308245
182	0.0070850	-0.0309945
183	0.0024001	-0.0310270
184	0.0006606	-0.0306577
185	-0.0004548	-0.0301826
186	-0.0012764	-0.0295370
187	-0.0017441	-0.0288952

171	-0.0020558	-0.0281658
172	-0.0022642	-0.0275139
173	-0.0025778	-0.0267945
174	-0.0030657	-0.0262260
175	-0.0042507	-0.0255790
176	-0.0054325	-0.0248536
177	-0.006626	-0.0242586
178	-0.007819	-0.0236168
179	-0.0090165	-0.0230004
180	-0.0102039	-0.0224192
181	-0.0113910	-0.0218396
182	-0.0125781	-0.0212604
183	-0.0137652	-0.0206816
184	-0.0149523	-0.0201024
185	-0.0161394	-0.0195232
186	-0.0173265	-0.0189440
187	-0.0185136	-0.0183648
188	-0.0197007	-0.0177856
189	-0.0208878	-0.0172064
190	-0.0220749	-0.0166272
191	-0.0232620	-0.0160480
192	-0.0244491	-0.0154688
193	-0.0256362	-0.0148896
194	-0.0268233	-0.0143104
195	-0.0280104	-0.0137312
196	-0.0291975	-0.0131520
197	-0.0303846	-0.0125728
198	-0.0315717	-0.0119936
199	-0.0327588	-0.0114144
200	-0.0339459	-0.0108352
201	-0.0351330	-0.0102560
202	-0.0363201	-0.0096768
203	-0.0375072	-0.0090976
204	-0.0386943	-0.0085184
205	-0.0398814	-0.0079392
206	-0.0410685	-0.0073600
207	-0.0422556	-0.0067808
208	-0.0434427	-0.0062016
209	-0.0446298	-0.0056224
210	-0.0458169	-0.0050432
211	-0.0470040	-0.0044640
212	-0.0481911	-0.0038848
213	-0.0493782	-0.0033056
214	-0.0505653	-0.0027264
215	-0.0517524	-0.0021472
216	-0.0529395	-0.0015680
217	-0.0541266	-0.0009888

218	-0.0014724	-0.0183817
219	-0.0022251	-0.0188808
220	-0.0031741	-0.0192592
221	-0.0042855	-0.0193905
222	-0.0063014	-0.0193054
223	-0.00724745	-0.0190277
225	-0.0147265	-0.0069637
226	-0.0123752	-0.0074286
227	-0.0097823	-0.0085838
228	-0.0066964	-0.0106160
229	-0.0130466	-0.0028880
48	-0.0113150	-0.0049504
230	-0.0086901	-0.0073317
49	-0.0055573	-0.0099576
231	-0.0038671	-0.0114274
50	-0.0024704	-0.0127181
232	-0.0010854	-0.0140236
51	-0.0000176	-0.0150640
233	-0.0010791	-0.0160173
52	-0.0019821	-0.0167067
234	-0.0031143	-0.0172687
53	-0.0043980	-0.0175364
235	-0.0065822	-0.0175687
54	-0.0098728	-0.0173640
237	-0.0130545	-0.0013882
238	-0.0115759	-0.0029876
239	-0.0102064	-0.0043796
241	-0.0073478	-0.0071516
242	-0.0125924	-0.0009653
56	-0.0115739	-0.0020401
243	-0.0104071	-0.0022042
57	-0.0022730	-0.0043228
244	-0.0064425	-0.0066528
245	-0.0048281	-0.0081903
246	-0.0034421	-0.0095409
247	-0.0019417	-0.0109900
248	-0.0007001	-0.0121792
249	-0.0005206	-0.0132945
250	-0.0015942	-0.0141231
251	-0.0029672	-0.0148608
252	-0.0044509	-0.0152567
253	-0.0068106	-0.0153899
254	-0.0101603	-0.0153101
256	-0.0119209	-0.0006711
257	-0.0104504	-0.0022428
258	-0.0095135	-0.0031049
259	-0.0081183	-0.0043890
260	-0.0100226	-0.0010677
59	-0.0095565	-0.0023749
261	-0.0083739	-0.0034199
60	-0.0071738	-0.0044877
262	-0.0056306	-0.0058827
61	-0.0042652	-0.0071359
263	-0.0027567	-0.0085207
62	-0.0014382	-0.0097176
264	-0.0000528	-0.0108810
63	-0.0011818	-0.0117698
265	-0.0027526	-0.0125920
64	-0.0044132	-0.0130701
266	-0.0069217	-0.0132669
65	-0.0102851	-0.0133063
268	-0.0104370	-0.0008218
269	-0.0094726	-0.0017634
270	-0.0035182	-0.0025724
271	-0.0074954	-0.0034188
272	-0.0061246	-0.0045593

273	0.0043102	-0.0056697
274	0.0033128	-0.0069341
275	0.0019657	-0.0080467
276	0.0044985	-0.0051739
277	-0.0038474	-0.0100650
278	-0.0025567	-0.0108975
279	-0.0043423	-0.0113935
280	-0.0069376	-0.0116591
281	-0.0102608	-0.0117273
282	0.0109037	-0.0006648
67	0.0052885	-0.0013733
283	0.0085274	-0.0019933
68	0.0076688	-0.0026551
284	0.0064580	-0.0035739
69	0.0052430	-0.0045061
285	0.0037157	-0.0056261
70	0.0024204	-0.0066287
286	0.0019095	-0.0076650
71	-0.0005192	-0.0085179
287	-0.0023550	-0.0093263
72	-0.0042434	-0.0098277
288	-0.0069037	-0.0101321
73	-0.0101663	-0.0101998
290	0.0095539	-0.0004954
291	0.0090070	-0.0010413
292	0.0084289	-0.0014851
293	0.0077385	-0.0019711
294	0.0066987	-0.0026728
295	0.0056064	-0.0033977
296	0.0042342	-0.0042956
297	0.0028898	-0.0051468
298	0.0013430	-0.0060446
299	-0.0001482	-0.0067917
300	-0.0020289	-0.0075479
301	-0.0040966	-0.0080320
302	-0.0068103	-0.0083203
303	-0.0094466	-0.0084657
304	0.0091767	-0.0003642
75	0.0087498	-0.0007714
305	0.0082752	-0.0011046
76	0.0077003	-0.0014631
306	0.0068106	-0.0019849
77	0.0058354	-0.0025322
307	0.0045562	-0.0032277
78	0.0032559	-0.0039113
308	0.0016951	-0.0046640
79	0.0001685	-0.0052997
309	-0.0013549	-0.0059589
80	-0.0039348	-0.0064038
310	-0.0066728	-0.0066579
81	-0.0096737	-0.0068540
312	0.0087962	-0.0002505
313	0.0084628	-0.0005157
314	0.0080762	-0.0007395
315	0.0075941	-0.0009833
316	0.0068371	-0.0013313
317	0.0059766	-0.0017082
318	0.0047958	-0.0022044
319	0.0035542	-0.0026980
320	0.0023259	-0.0032587
321	0.0013475	-0.0037571
322	-0.0016103	-0.0042735
323	-0.0037394	-0.0046250
324	-0.0064710	-0.0048801
325	-0.0093179	-0.0050483
326	0.0084820	-0.0001500

82	0.001199	-0.0003052
327	0.0018757	-0.0004356
84	0.0024517	-0.0005311
328	0.0067922	-0.0007961
85	0.0060164	-0.0010328
329	0.0049240	-0.0013563
86	0.0027452	-0.0016846
330	0.0022566	-0.0020657
87	0.0007085	-0.0024180
331	-0.0014145	-0.0027932
88	-0.0035604	-0.0030622
332	-0.0062682	-0.0032771
89	-0.0039640	-0.0033977
334	0.0081418	-0.0000196
335	0.0079023	-0.0000484
347	0.0076245	-0.0000758
336	0.0072685	-0.0001111
337	0.0066801	-0.0001783
338	0.0059811	-0.0002637
339	0.0049815	-0.0003871
340	0.0038694	-0.0005273
341	0.0024228	-0.0007037
342	0.0008956	-0.0008703
343	-0.0012119	-0.0010659
344	-0.0033616	-0.0012154
345	-0.0060321	-0.0013378
346	-0.0085628	-0.0014552
348	0.0078619	0.0001032
91	0.0076513	0.0002001
349	0.0073955	0.0002672
92	0.0070657	0.0003272
350	0.0065348	0.0003978
93	0.0058914	0.0004520
351	0.0049499	0.0005003
94	0.0038841	0.0005238
352	0.0024807	0.0005328
95	0.0009872	0.0005234
353	-0.0010913	0.0005035
96	-0.0032283	0.0004723
354	-0.0058499	0.0004338
97	-0.0082678	0.0003674
356	0.0074976	0.0003172
357	0.0072962	0.0006291
358	0.0070714	0.0008558
359	0.0067773	0.0010754
360	0.0062755	0.0013548
361	0.0056690	0.0016146
362	0.0047871	0.0019070
363	0.0037765	0.0021645
364	0.0024298	0.0024237
365	0.0009770	0.0026309
366	-0.0010674	0.0028361
367	-0.0031577	0.0029649
368	-0.0057091	0.0030325
369	-0.0081014	0.0030355
370	0.0070492	0.0006091
99	0.0068781	0.0012105
371	0.0066505	0.0016498
100	0.0063617	0.0020779
372	0.0058984	0.0026176
101	0.0053344	0.0031273
373	0.0044815	0.0037016
102	0.0035151	0.0042167
374	0.0022276	0.0047235
103	0.0008178	0.0051414
375	-0.0011645	0.0055082

104	-0.003179	0.0057410
240	-0.0055924	0.0058387
105	-0.0081005	0.0058433

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LOADING - SIX

2-2.6

RESULTANT JOINT DISPLACEMENTS - SUPPORTS

JOINT	DISPLACEMENT		
	X DISP.	Y DISP.	Z DISP.
1	0.0	-0.0664430	
106	0.0	-0.0665298	
2	0.0	-0.0661255	
107	0.0	-0.0648769	
3	0.0	-0.0633215	
108	0.0	-0.0609817	
4	0.0	-0.0586625	
109	0.0	-0.0558737	
5	0.0	-0.0533082	
110	0.0	-0.0506855	
6	0.0	-0.0485526	
111	0.0	-0.0463487	
7	0.0	-0.0447382	
112	0.0	-0.0433588	
8	0.0	-0.0419042	
47	0.0236795	0.0	
236	0.0215407	0.0	
55	0.0200172	0.0	
255	0.0186684	0.0	
58	0.0175669	0.0	
267	0.0164557	0.0	
66	0.0155980	0.0	
289	0.0147957	0.0	
74	0.0141172	0.0	
311	0.0134897	0.0	
82	0.0129837	0.0	
333	0.0124429	0.0	
90	0.0119911	0.0	
355	0.0114567	0.0	
98	0.0107507	0.0	

RESULTANT JOINT DISPLACEMENTS - FREE JOINTS

JOINT	DISPLACEMENT		
	X DISP.	Y DISP.	Z DISP.
113	0.0013629	-0.0677201	
114	0.0015734	-0.0669626	
115	0.0012995	-0.0662147	
116	0.0009252	-0.0648212	
9	0.0030078	-0.0687717	
117	0.0028372	-0.0674419	
10	0.0024689	-0.0662113	
118	0.0011034	-0.0628217	
119	0.0004435	-0.0605364	
120	-0.0000044	-0.0581836	
121	-0.0003696	-0.0553982	
122	-0.0005809	-0.0528964	

123	-0.00036919	-0.0503350
124	-0.0007555	-0.0482369
125	-0.0008519	-0.0460520
126	-0.0009933	-0.0445346
127	-0.0013617	-0.0431166
128	-0.0020601	-0.0417511
129	0.0047134	-0.0678944
130	0.0042887	-0.0670572
131	0.0025192	-0.0641294
11	0.0066255	-0.0677902
132	0.0046316	-0.0651787
12	0.0020274	-0.0615027
133	0.0008054	-0.0590776
13	-0.0000660	-0.0567174
134	-0.0007336	-0.0540225
14	-0.0011194	-0.0516744
135	-0.0013511	-0.0492797
15	-0.0014925	-0.0473035
136	-0.0016660	-0.0452140
16	-0.0019586	-0.0438491
137	-0.0026919	-0.0424572
17	-0.0040809	-0.0412297
138	0.0085460	-0.0661691
139	0.0069608	-0.0652880
140	0.0038934	-0.0622214
18	0.0102446	-0.0653707
141	0.0083860	-0.0639595
19	0.0066675	-0.0625762
142	0.0027631	-0.0588380
143	0.0010297	-0.0564367
144	-0.0001709	-0.0542254
145	-0.0010623	-0.0517882
146	-0.0015753	-0.0496728
147	-0.0019331	-0.0475400
148	-0.0021538	-0.0458095
149	-0.0024313	-0.0440219
150	-0.0028734	-0.0427006
151	-0.0039631	-0.0414546
152	-0.0060099	-0.0402119
153	0.0119789	-0.0629503
154	0.0098011	-0.0620503
155	0.0050457	-0.0588427
20	0.0139174	-0.0612966
156	0.0084082	-0.0584018
21	0.0032835	-0.0547827
157	0.0011918	-0.0526148
22	-0.0002163	-0.0507256
158	-0.0013162	-0.0486972
23	-0.0019671	-0.0469379
159	-0.0023988	-0.0451947
24	-0.0027051	-0.0437726
160	-0.0031201	-0.0422786
25	-0.0037130	-0.0411371
161	-0.0051588	-0.0400738
26	-0.0078264	-0.0388810
162	0.0159316	-0.0579526
163	0.0120331	-0.0568967
164	0.0059130	-0.0537962
27	0.0177507	-0.0551307
165	0.0131945	-0.0536213
28	0.0097115	-0.0521742
166	0.0037156	-0.0492145
167	0.0013912	-0.0476697
168	-0.0001616	-0.0463095
169	-0.0014181	-0.0448435
170	-0.0021883	-0.0436014

171	-0.027398	-0.0423246
172	-0.0031312	-0.0412780
173	-0.0036353	-0.0401550
174	-0.0044712	-0.0392608
175	-0.0062573	-0.0383228
176	-0.0094605	-0.0373024
177	0.0196613	-0.0499854
178	0.0142252	-0.0490417
179	0.0065781	-0.0469906
25	0.0213205	-0.0441042
180	0.0107060	-0.0437054
30	0.0043005	-0.0425557
181	0.0017491	-0.0418339
31	0.0000379	-0.0411651
182	-0.0013064	-0.0404262
32	-0.0022024	-0.0397658
183	-0.0029063	-0.0390622
33	-0.0034177	-0.0384299
184	-0.0041251	-0.0377069
34	-0.0051191	-0.0370701
185	-0.0072373	-0.0363017
35	-0.0105251	-0.0354567
186	0.0213928	-0.0391718
187	0.0155423	-0.0391171
188	0.0073902	-0.0392015
36	0.0213925	-0.0348049
189	0.0161242	-0.0347821
37	0.0116916	-0.0349772
190	0.0049900	-0.0354077
191	0.0023573	-0.0355380
192	0.0005417	-0.0356335
193	-0.0009837	-0.0356724
194	-0.0020033	-0.0356285
195	-0.0028555	-0.0355117
196	-0.0035314	-0.0353305
197	-0.0044551	-0.0350064
198	-0.0056528	-0.0346330
199	-0.0080794	-0.0340775
200	-0.0121802	-0.0333416
201	0.0216632	-0.0307089
202	0.0165988	-0.0307236
203	0.0082294	-0.0313357
38	0.0218651	-0.0265960
204	0.0121586	-0.0268872
39	0.0058268	-0.0282841
205	0.0031976	-0.0292479
40	0.0012762	-0.0300413
206	-0.0004101	-0.0308217
41	-0.0015828	-0.0313563
207	-0.0026151	-0.0318296
42	-0.0034907	-0.0320653
208	-0.0046543	-0.0321441
43	-0.0060599	-0.0320295
209	-0.0087878	-0.0316721
44	-0.0132398	-0.0310850
210	0.0221058	-0.0222055
211	0.0161968	-0.0222986
212	0.0089100	-0.0237814
45	0.0221379	-0.0173715
224	0.0163757	-0.0176720
46	0.0123541	-0.0188274
213	0.0068305	-0.0215844
214	0.0042244	-0.0232712
215	0.0022221	-0.0247025
216	0.0004106	-0.0261349
217	-0.0009452	-0.0272227

218	-0.0022285	-0.0281484
219	-0.003303	-0.0287548
220	-0.0047074	-0.0291993
221	-0.0063639	-0.0293242
222	-0.0093609	-0.0291521
223	-0.0140526	-0.0287147
225	0.0228414	-0.0110468
226	0.013723	-0.0117732
227	0.0147672	-0.0136022
228	0.0097594	-0.0168227
229	0.0200363	-0.0045612
48	0.0172584	-0.0078162
230	0.0130069	-0.0115745
49	0.0082165	-0.0157123
231	0.0054402	-0.0179807
50	0.0033686	-0.0199209
232	0.0013813	-0.0218111
51	-0.0001865	-0.0232776
233	-0.0016981	-0.0245841
52	-0.0029933	-0.0255080
234	-0.0046514	-0.0262461
53	-0.0065544	-0.0265811
235	-0.0098005	-0.0265850
54	-0.0146763	-0.0262589
237	0.0200374	-0.0021780
238	0.0176697	-0.0046924
239	0.0154671	-0.0068822
241	0.0108763	-0.0112522
242	0.0192951	-0.0015056
56	0.0176646	-0.0031850
243	0.0157940	-0.0050120
57	0.0139761	-0.0067706
244	0.0094949	-0.0104204
245	0.0069982	-0.0128126
246	0.0049049	-0.0148852
247	0.0026806	-0.0170720
248	0.0008685	-0.0188260
249	-0.0008961	-0.0204395
250	-0.0024529	-0.0216177
251	-0.0044668	-0.0226477
252	-0.0066604	-0.0231880
253	-0.0101672	-0.0233516
254	-0.0151473	-0.0232086
256	0.0182225	-0.0010388
257	0.0158731	-0.0034856
258	0.0143777	-0.0048341
259	0.0121599	-0.0068459
260	0.0166332	-0.0016465
59	0.0144600	-0.0036798
261	0.0125881	-0.0053100
60	0.0107043	-0.0069781
262	0.0083022	-0.0091561
61	0.0062156	-0.0110942
263	0.0039483	-0.0132132
62	0.0019904	-0.0150190
264	-0.0000449	-0.0167463
63	-0.0018567	-0.0180497
265	-0.0041700	-0.0192371
64	-0.0066261	-0.0199167
266	-0.0103582	-0.0201842
65	-0.0153750	-0.0202192
268	0.0158686	-0.0012628
269	0.0143426	-0.0027190
270	0.0128390	-0.0039773
271	0.0112372	-0.0052956
272	0.0091075	-0.0070710

273	0.0070439	-0.0087540
274	0.0048215	-0.0107324
275	0.00228057	-0.0124322
276	0.0006289	-0.0141225
277	-0.0013610	-0.0154550
278	-0.0038871	-0.0166728
279	-0.0065350	-0.0173989
280	-0.0104009	-0.0177743
281	-0.0153691	-0.0178566
282	0.0151894	-0.0010227
67	0.0140642	-0.0021120
283	0.0128707	-0.0030733
68	0.0115306	-0.0041012
284	0.0096533	-0.0055287
69	0.0077360	-0.0069754
285	0.0055532	-0.0087045
70	0.0035133	-0.0102402
286	0.0012573	-0.0118133
71	-0.0008671	-0.0130965
287	-0.0035902	-0.0142999
72	-0.0063973	-0.0150389
288	-0.0102673	-0.0154784
73	-0.0152557	-0.0155642
290	0.0144886	-0.0007596
291	0.0136334	-0.0016005
292	0.0127324	-0.0022863
293	0.0116598	-0.0030396
294	0.0100519	-0.0041289
295	0.0083743	-0.0052534
296	0.0062826	-0.0066429
297	0.0042492	-0.0079540
298	0.0019275	-0.0093267
299	-0.0003006	-0.0104611
300	-0.0032082	-0.0116007
301	-0.0061872	-0.0123232
302	-0.0102452	-0.0127465
303	-0.0149577	-0.0129508
304	0.0139042	-0.0095587
75	0.0132407	-0.0011862
305	0.0125045	-0.0017013
76	0.0116156	-0.0022567
306	0.0102443	-0.0030669
77	0.0087489	-0.0039164
307	0.0067988	-0.0049945
78	0.0048280	-0.0060515
308	0.0024761	-0.0072093
79	0.0001864	-0.0081817
309	-0.0028400	-0.0091836
80	-0.0059505	-0.0098544
310	-0.0100540	-0.0102317
81	-0.0145751	-0.0105152
312	0.0133181	-0.0003864
313	0.0128032	-0.0007961
314	0.0122070	-0.0011432
315	0.0114648	-0.0015219
316	0.0103027	-0.0020634
317	0.0089861	-0.0026501
318	0.0071369	-0.0034220
319	0.0053037	-0.0041883
320	0.0029954	-0.0050563
321	0.0006620	-0.0058247
322	-0.0024679	-0.0066161
323	-0.0056608	-0.0071510
324	-0.0097684	-0.0075342
325	-0.0140647	-0.0077797
326	0.0128368	-0.0002340

83	0.0124027	-0.0004764
327	0.0119059	-0.0006804
84	0.0112712	-0.0009082
328	0.0122467	-0.0012451
85	0.0099626	-0.0016161
329	0.0074226	-0.0021231
86	0.0056112	-0.0026364
330	0.0033576	-0.0032305
87	0.0010264	-0.0037783
331	-0.0021579	-0.0043588
88	-0.0053939	-0.0047718
332	-0.0094714	-0.0050971
89	-0.0135509	-0.0052728
334	0.0123192	-0.0000360
335	0.0119529	-0.0000866
347	0.0115285	-0.0001336
336	0.0109851	-0.0001931
337	0.0100877	-0.0003041
338	0.0090235	-0.0004734
339	0.0075044	-0.0006430
340	0.0058177	-0.0008686
341	0.0036287	-0.0011502
342	0.0013221	-0.0014150
343	-0.0018560	-0.0017237
344	-0.0050961	-0.0019576
345	-0.0091262	-0.0021443
346	-0.0129612	-0.0023183
348	0.0118954	0.0001501
91	0.0115744	0.0002902
349	0.0111854	0.0003868
92	0.0106828	0.0004723
350	0.0098751	0.0005716
93	0.0088973	0.0006457
351	0.0074680	0.0007084
94	0.0058525	0.0007336
352	0.0037273	0.0007350
95	0.0014701	0.0007102
353	-0.0016688	0.0006695
96	-0.0048952	0.0006143
354	-0.0088579	0.0005537
97	-0.0125246	0.0004538
356	0.0113468	0.0004745
357	0.0110408	0.0004908
358	0.0106990	0.0012797
359	0.0102522	0.0016075
360	0.0094901	0.0020242
361	0.0085697	0.0024110
362	0.0072315	0.0028454
363	0.0057001	0.0032270
364	0.0036612	0.0036099
365	0.0014635	0.0039150
366	-0.0016281	0.0042168
367	-0.0047882	0.0044059
368	-0.0086492	0.0045046
369	-0.0122774	0.0045089
370	0.0106723	0.0009172
99	0.0104122	0.0018226
371	0.0100667	0.0024830
100	0.0096282	0.0031280
372	0.0089248	0.0039392
101	0.0080688	0.0047047
373	0.0067758	0.0055664
102	0.0053116	0.0063383
374	0.0033615	0.0070962
103	0.0012273	0.0077207
375	-0.0017717	0.0082672

104	-0.0048204	0.0086144
240	-0.0086216	0.0087606
105	-0.0122703	0.0087687

115

LOADING - EIGHT R=0.8

RESULTANT JOINT DISPLACEMENTS - SUPPORTS

JOINT	DISPLACEMENT		
	X DISP.	Y DISP.	Z DISP.
1	0.0	-0.0790450	
106	0.0	-0.0791711	
2	0.0	-0.0788202	
107	0.0	-0.0776277	
3	0.0	-0.0761351	
108	0.0	-0.0738548	
4	0.0	-0.0715309	
109	0.0	-0.0686616	
5	0.0	-0.0659477	
110	0.0	-0.0630914	
6	0.0	-0.0607151	
111	0.0	-0.0581989	
7	0.0	-0.0563168	
112	0.0	-0.0546607	
8	0.0	-0.0528788	
47	0.0316241	0.0	
236	0.0285694	0.0	
55	0.0263967	0.0	
255	0.0244790	0.0	
58	0.0229280	0.0	
267	0.0213812	0.0	
66	0.0202000	0.0	
289	0.0191115	0.0	
74	0.0181990	0.0	
311	0.0173661	0.0	
82	0.0167005	0.0	
333	0.0159961	0.0	
90	0.0154125	0.0	
355	0.0147290	0.0	
98	0.0138282	0.0	

RESULTANT JOINT DISPLACEMENTS - FREE JOINTS

JOINT	DISPLACEMENT		
	X DISP.	Y DISP.	Z DISP.
113	0.0014848	-0.0803314	
114	0.0017135	-0.0796134	
115	0.0014557	-0.0789094	
116	0.0010787	-0.0775849	
9	0.0032513	-0.0814122	
117	0.0031684	-0.0801217	
10	0.0027834	-0.0789363	
118	0.0014593	-0.0757496	
119	0.0007580	-0.0734344	
120	0.0002382	-0.0710648	
121	-0.0002202	-0.0681791	
122	-0.0005163	-0.0655102	

123	-0.0007117	-0.0627067
124	-0.0008405	-0.0603561
125	-0.0010016	-0.0578977
126	-0.0012067	-0.0553732
127	-0.0016803	-0.0543694
128	-0.0025421	-0.0526913
129	0.0050746	-0.0305870
130	0.0047114	-0.0797886
131	0.0030494	-0.0769783
11	0.0071031	-0.0805607
132	0.0052784	-0.0780386
12	0.0027441	-0.0744303
133	0.0014235	-0.0720606
13	0.0034109	-0.0696363
134	-0.0004589	-0.0667744
14	-0.0010032	-0.0642157
135	-0.0014005	-0.0615417
15	-0.0016667	-0.0592915
136	-0.0019653	-0.0569846
16	-0.0023829	-0.0552558
137	-0.0033241	-0.0535737
17	-0.0050387	-0.0520570
138	0.00091342	-0.0790525
139	0.0076738	-0.0782166
140	0.0048049	-0.0752642
18	0.0109398	-0.0784033
141	0.0092614	-0.0770345
19	0.0076815	-0.0757167
142	0.0038483	-0.0720496
143	0.0019258	-0.0695643
144	0.0004877	-0.0671784
145	-0.0007010	-0.0644711
146	-0.0014598	-0.0620695
147	-0.0020369	-0.0596017
148	-0.0024252	-0.0575747
149	-0.0028792	-0.0554632
150	-0.0035052	-0.0538808
151	-0.0049008	-0.0523599
152	-0.0074267	-0.0508216
153	0.0127480	-0.0761937
154	0.0108393	-0.0753324
155	0.0063816	-0.0722503
20	0.0147433	-0.0748304
156	0.0099037	-0.0720798
21	0.0047342	-0.0683553
157	0.0022790	-0.0658947
22	0.0005357	-0.0636792
158	-0.0009320	-0.0612263
23	-0.0018872	-0.0590830
159	-0.0025809	-0.0565543
24	-0.0030820	-0.0552199
160	-0.0037163	-0.0533975
25	-0.0045449	-0.0520002
161	-0.0063901	-0.0506853
26	-0.0096838	-0.0492020
162	0.0167579	-0.0719823
163	0.0135371	-0.0709908
164	0.0076926	-0.0678405
27	0.0185295	-0.0699404
165	0.0149866	-0.0684125
28	0.0118083	-0.0669029
166	0.0053469	-0.0632288
167	0.0025328	-0.0610360
168	0.0005683	-0.0591107
169	-0.0011091	-0.0570520
170	-0.0021942	-0.0553503

171	-0.0030126	-0.0536714
172	-0.0036186	-0.0523012
173	-0.0044268	-0.0508637
174	-0.0054931	-0.0497331
175	-0.0077648	-0.0485554
176	-0.0117277	-0.0472753
177	0.0203541	-0.0662854
178	0.0164048	-0.0652440
179	0.0086526	-0.0618751
29	0.0223493	-0.0633306
180	0.0131727	-0.0600317
30	0.0257762	-0.0566900
181	0.0027304	-0.0549306
31	0.0006062	-0.0534799
182	-0.0011320	-0.0520837
32	-0.0023143	-0.0509470
183	-0.0032833	-0.0498409
33	-0.0040160	-0.0489166
184	-0.0050000	-0.0479186
34	-0.0062143	-0.0470732
185	-0.0089997	-0.0460855
35	-0.0135764	-0.0450157
186	0.0244475	-0.0585539
187	0.0181531	-0.0572338
188	0.0092330	-0.0541112
36	0.0262115	-0.0541742
189	0.0191738	-0.0524162
37	0.0139095	-0.0508062
190	0.0061366	-0.0485331
191	0.0030416	-0.0476824
192	0.0008708	-0.0470809
193	-0.0003553	-0.0465093
194	-0.0022176	-0.0460537
195	-0.0033252	-0.0456006
196	-0.0042253	-0.0451855
197	-0.0054485	-0.0446377
198	-0.0070039	-0.0440964
199	-0.0100716	-0.0433575
200	-0.0151642	-0.0424131
201	0.0282806	-0.0473608
202	0.0201187	-0.0462157
203	0.0096017	-0.0444630
38	0.0299056	-0.0394878
204	0.0142962	-0.0391101
39	0.0067049	-0.0393766
205	0.0027106	-0.0397725
40	0.0014826	-0.0401476
206	-0.0024897	-0.0405662
41	-0.0018746	-0.0408832
207	-0.0031417	-0.0411099
42	-0.0042499	-0.0411953
208	-0.0057449	-0.0411278
43	-0.0075437	-0.0408939
209	-0.0109828	-0.0403938
44	-0.0165270	-0.0396251
210	0.0300038	-0.0321296
211	0.0203615	-0.0321409
212	0.0103008	-0.0337390
45	0.0297636	-0.0246541
224	0.0208885	-0.0250380
46	0.0149223	-0.0267248
213	0.0078398	-0.0300465
214	0.0047672	-0.0317875
215	0.0024517	-0.0332043
216	0.0003585	-0.0346106
217	-0.0012322	-0.0356615

218	-0.0027715	-0.0365339
219	-0.0040988	-0.0370942
220	-0.0058620	-0.0374863
221	-0.0079588	-0.0375477
222	-0.0117292	-0.0372711
223	-0.0175309	-0.0365887
225	0.0305655	-0.0155376
226	0.0249650	-0.0164985
227	0.0186523	-0.0190985
228	0.0116245	-0.0235222
229	0.0264747	-0.0063256
48	0.0224228	-0.0108449
230	0.0162085	-0.0160847
49	0.0094881	-0.0216409
231	0.0062933	-0.0244983
50	0.0033075	-0.0268300
232	0.0014774	-0.0289763
51	-0.0003845	-0.0306076
233	-0.0022011	-0.0320334
52	-0.0037749	-0.0330244
234	-0.0058391	-0.0338027
53	-0.0082321	-0.0341312
235	-0.0123116	-0.0340742
54	-0.0184079	-0.0336343
237	0.0264333	-0.0029706
238	0.0230201	-0.0064254
239	0.0198327	-0.0094490
241	0.0133725	-0.0154830
242	0.0253649	-0.0020273
56	0.0220256	-0.0043021
243	0.0203457	-0.0068122
57	0.0177675	-0.0092389
244	0.0116520	-0.0141691
245	0.0084247	-0.0173201
246	0.0058114	-0.0199722
247	0.0030750	-0.0226917
248	0.0003771	-0.0248085
249	-0.0012593	-0.0267220
250	-0.0031622	-0.0280956
251	-0.0056602	-0.0292739
252	-0.0084051	-0.0298761
253	-0.0128109	-0.0300292
254	-0.0170613	-0.0298137
256	-0.0238433	-0.0013766
257	0.0205094	-0.0046704
258	0.0184051	-0.0065052
259	0.0153287	-0.0092432
260	0.0216106	-0.0021690
59	0.0185679	-0.0049009
261	0.0152880	-0.0071022
60	0.0134410	-0.0093520
262	0.0102559	-0.0122699
61	0.0075715	-0.0148144
263	0.0047215	-0.0175385
62	0.0022933	-0.0198124
264	-0.0002122	-0.0215413
63	-0.0024502	-0.0235272
265	-0.0053263	-0.0245478
64	-0.0083959	-0.0257469
266	-0.0130892	-0.0260424
65	-0.0194088	-0.0260501
268	-0.0205630	-0.0016523
269	0.0184516	-0.0035840
270	0.0163942	-0.0052719
271	0.0142320	-0.0070407
272	0.0114035	-0.0094142

273	0.0037732	-0.0116966
274	0.0058825	-0.0142231
275	0.0033516	-0.0163576
276	0.0006376	-0.0185377
277	-0.0018333	-0.0201837
278	-0.0049878	-0.0216839
279	-0.0083039	-0.0225537
280	-0.0131718	-0.0229916
281	-0.0194473	-0.0230650
282	0.0196388	-0.0013333
67	0.0181010	-0.0027690
283	0.0164798	-0.0040494
68	0.0146787	-0.0054209
284	0.0121871	-0.0073236
69	0.0097440	-0.0092442
285	0.0068702	-0.0115143
70	0.0042824	-0.0135046
286	0.0014470	-0.0155170
71	-0.0012157	-0.0171358
287	-0.0046233	-0.0186361
72	-0.0081481	-0.0195465
288	-0.0131557	-0.0200741
73	-0.0193467	-0.0201585
290	0.0185950	-0.0009895
291	0.0175387	-0.0020943
292	0.0163280	-0.0030007
293	0.0148959	-0.0040013
294	0.0127673	-0.0054503
295	0.0105713	-0.0069423
296	0.0078659	-0.0087765
297	0.0052639	-0.0104921
298	0.0023222	-0.0122677
299	-0.0004868	-0.0137205
300	-0.0041460	-0.0151653
301	-0.0078988	-0.0160704
302	-0.0130290	-0.0165902
303	-0.0190179	-0.0168269
304	0.0179150	-0.0007274
75	0.0170270	-0.0015511
305	0.0160457	-0.0022310
76	0.0148671	-0.0029671
306	0.0130591	-0.0040443
77	0.0111046	-0.0051720
307	0.0085735	-0.0065989
78	0.0060463	-0.0079906
308	0.0030487	-0.0095024
79	0.0001468	-0.0107617
309	-0.0036781	-0.0120474
80	-0.0076092	-0.0128989
310	-0.0128105	-0.0133693
81	-0.0185748	-0.0137113
312	0.0171389	-0.0005061
313	0.0164573	-0.0010448
314	0.0156697	-0.0015041
315	0.0146923	-0.0020071
316	0.0131639	-0.0027277
317	0.0114522	-0.0035094
318	0.0091213	-0.0045354
319	0.0066978	-0.0055501
320	0.0037445	-0.0066941
321	0.0007728	-0.0076999
322	-0.0031991	-0.0087276
323	-0.0072486	-0.0094156
324	-0.0124709	-0.0099003
325	-0.0179652	-0.0102004
326	0.0165075	-0.0003107

83	0.0159475	-0.0006330
327	0.0152062	-0.0009054
84	0.0144555	-0.0012103
328	0.0131186	-0.0016520
85	0.0115799	-0.0021599
329	0.0094286	-0.0023399
86	0.0071245	-0.0035255
330	0.0042361	-0.0043161
87	0.0012585	-0.0050414
331	-0.0028092	-0.0058044
88	-0.0069131	-0.0063423
332	-0.0121108	-0.0067581
89	-0.0173417	-0.0069726
334	0.0158346	-0.0000557
335	0.0153572	-0.0001312
347	0.0148047	-0.0002002
336	0.0140982	-0.0002361
337	0.0129330	-0.0004437
338	0.0115544	-0.0006391
339	0.0095926	-0.0009170
340	0.0074209	-0.0012285
341	0.0046112	-0.0016137
342	0.0016588	-0.0019735
343	-0.0024007	-0.0023898
344	-0.0065362	-0.0027013
345	-0.0116876	-0.0029427
346	-0.0166145	-0.0031595
348	0.0152883	0.0001833
91	0.0148719	0.0003533
349	0.0143677	0.0004692
92	0.0137169	0.0005705
350	0.0126721	0.0006860
93	0.0114088	0.0007682
351	0.0095658	0.0008319
94	0.0074871	0.0008471
352	0.0047578	0.0008289
95	0.0018642	0.0007798
353	-0.0021525	0.0007096
96	-0.0062797	0.0006272
354	-0.0113556	0.0005457
97	-0.0160716	0.0004187
356	0.0145871	0.0006004
357	0.0141916	0.0011903
358	0.0137501	0.0016184
359	0.0131730	0.0020320
360	0.0121897	0.0025571
361	0.0110033	0.0030435
362	0.0092801	0.0035878
363	0.0073094	0.0040642
364	0.0046904	0.0045402
365	0.0018706	0.0049177
366	-0.0020925	0.0052904
367	-0.0061423	0.0055236
368	-0.0110952	0.0056445
369	-0.0157623	0.0056495
370	0.0137270	0.0011705
99	0.0133913	0.0023255
371	0.0129455	0.0031689
100	0.0123799	0.0039897
372	0.0114728	0.0050223
101	0.0103693	0.0059955
373	0.0087052	0.0070891
102	0.0068224	0.0080671
374	0.0043161	0.0090249
103	0.0015758	0.0098126
375	-0.0022711	0.0104990

104
240
105

-0.0061817
-0.0110607
-0.0157606

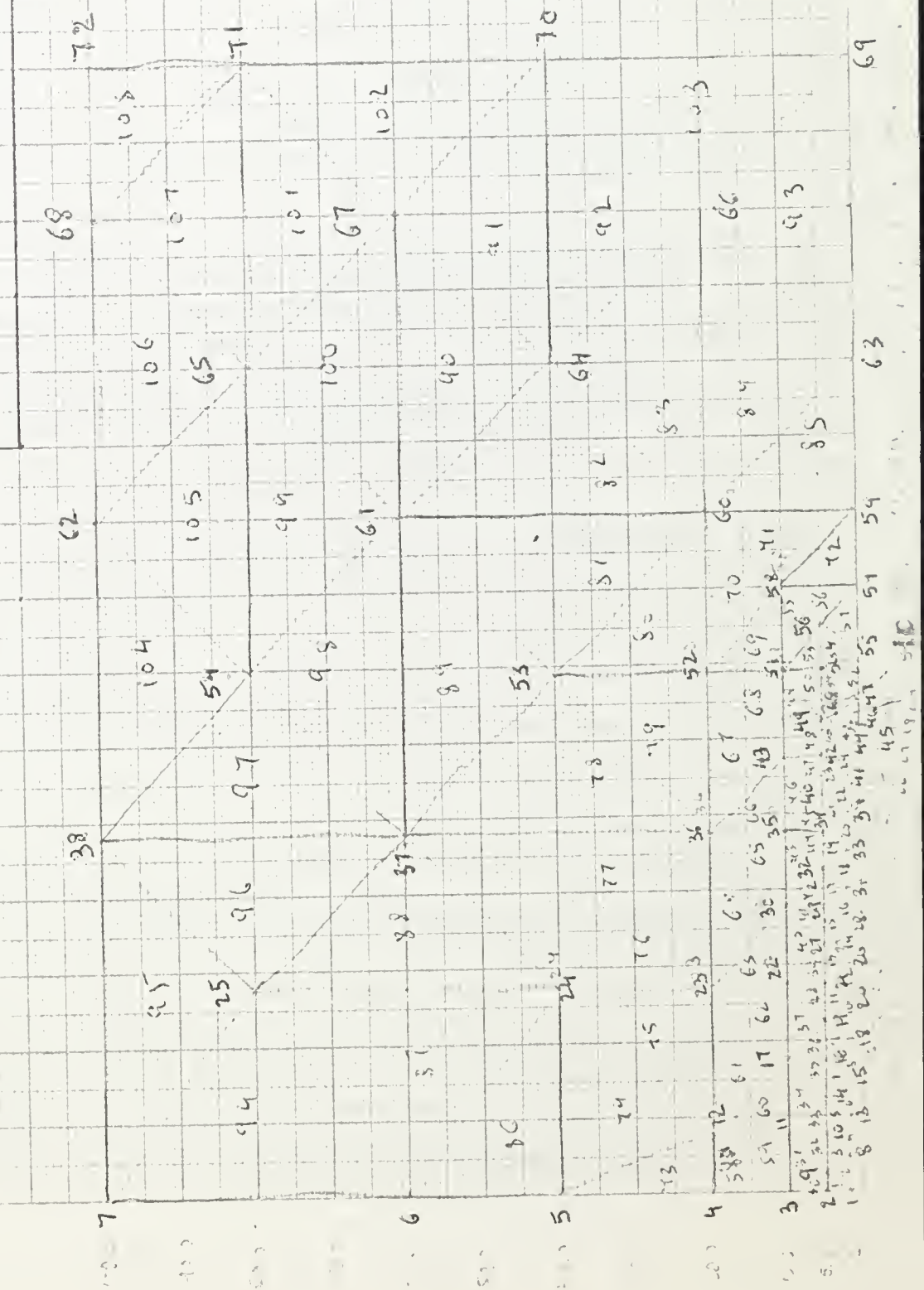
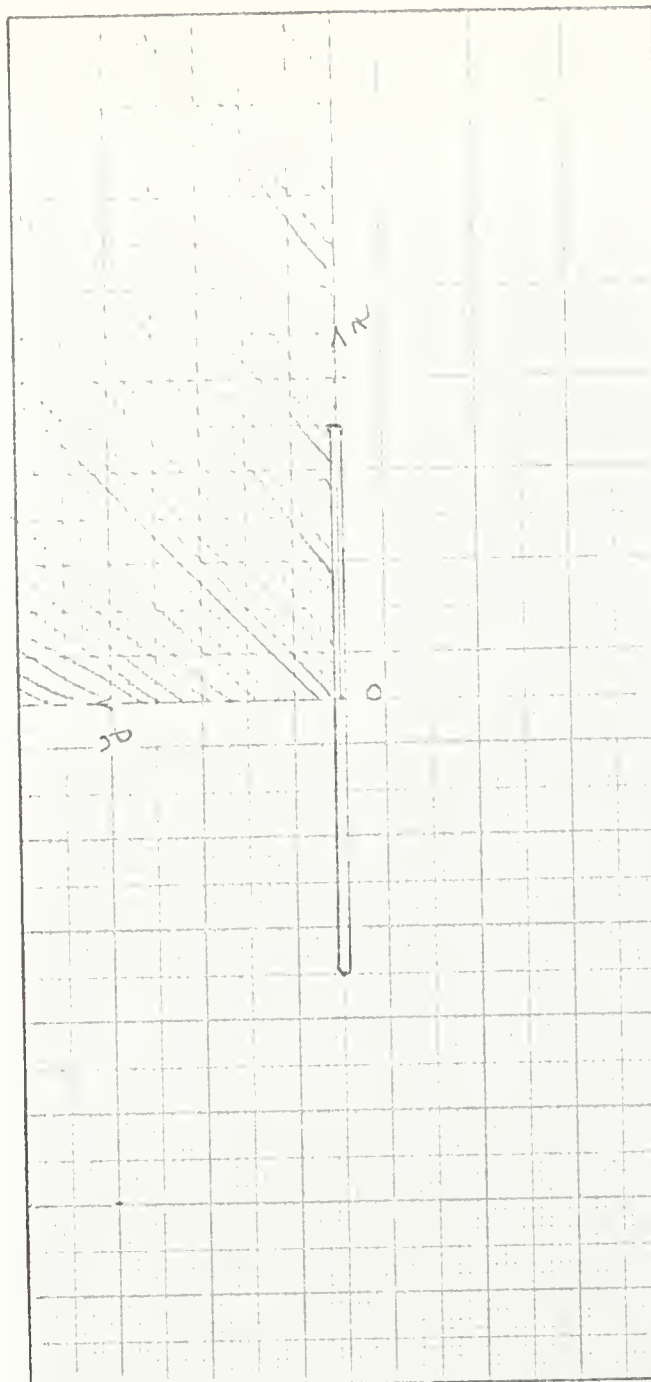
0.0109354
0.0111199
0.0111323

APPENDIX 3

Straight slit , 'CSTG' type .

The following presents :

- 1- Plate division , numbers are element names and node names , page 123
- 2- Input data , pp 124 - 131 .
- 3- Output data , pp 132 - 139 .



APPENDIX 2 STRAIGHT SLIT

TYPE PLANE STRESS

UNITS CENTIMETERS KILOGRAMS

JOINT COORDINATES

1	.00	.15	S
2	.00	.50	S
3	.00	1.00	S
4	.00	2.00	S
5	.00	4.00	S
6	.00	6.00	S
7	.00	10.00	S
8	.50	.15	
9	.25	.50	
10	.75	.50	
11	.75	1.00	
12	.75	2.00	
13	1.00	.15	
14	1.25	.50	
15	1.50	.15	
16	1.75	.50	
17	1.75	1.00	
18	2.00	.15	
19	2.25	.50	
20	2.50	.15	

21 2.75 .50

22 2.75 1.00

23 2.75 2.00

24 2.75 4.00

25 2.75 8.00

26 3.00 .15

27 3.25 .50

28 3.50 .15

29 3.75 .50

30 3.75 1.00

31 4.00 .15

32 4.25 .50

33 4.50 .15

34 4.75 .50

35 4.75 1.00

36 4.75 2.00

37 4.75 6.00

38 4.75 10.00

39 5.00 .15

40 5.25 .50

41 5.50 .15

42 5.75 .50

43 5.75 1.00

44 6.00 .15

45 6.10 .10

46 6.15 .00 S

47 6.50 .00 S

48 6.30 .30

49 6.25 .50

50 6.90 .50

51 6.90 1.00

52 6.90 2.00

53 6.90 4.00

55 7.15 .00 S

56 7.50 .50

57 8.00 .00 S

58 8.00 1.00

59 9.00 .00 S

60 9.00 2.00

61 9.00 6.00

62 9.00 10.00

63 11.00 .00 S

64 11.00 4.00

65 11.00 8.00

66 13.00 2.00

67 13.00 6.00

68 13.00 10.00

69 15.00 .00 S

70 15.00 4.00

71 15.00 8.00

72 15.00 10.00

ELEMENT INCIDENCES

1 1 9 2

2 1 8 9

3 9 8 10

4 8 13 10

5 10 13 14

6 13 15 14

7 14 15 16

8 15 18 16

9 16 18 19

10 18 20 19

11 19 20 21

12 20 26 21

13 21 26 27

14 26 28 27

15 27 28 29

16 28 31 29

17 29 31 32

18 31 33 32

19 32 33 34

20 33 39 34

21 34 39 40

22 40 39 41

23 40 41 42

24 41 44 42

25 42 44 49

26 49 44 48

27 48 44 45

28 48 45 46

29 48 46 47

30 2 9 3

31 3 9 11

32 9 10 11

33 11 10 14

34 11 14 17

35 14 16 17

36 16 19 17

37 17 19 22

38 19 21 22

39 22 21 27

40 22 27 30

41 27 29 30

42 30 29 32

43 30 32 35

44 32 34 35

45 35 34 40

46 35 40 43

47 40 42 43

128

48 43 42 49

49 43 49 51

50 49 50 51

51 49 48 50

109 48 47 50

52 50 47 55

53 51 50 56

54 56 50 55

55 51 56 58

56 56 57 58

57 55 57 56

58 4 3 12

59 3 11 12

60 12 11 17

61 12 17 23

62 17 22 23

63 23 22 30

64 23 30 36

65 30 35 36

66 36 35 43

67 36 43 52

68 43 51 52

69 52 51 58

70 52 58 60

71 58 59 60

72 58 57 59

73 5 4 12

74 5 12 24

75 12 23 24

76 24 23 36

77 24 36 37

78 37 36 53

79 36 52 53

80 53 52 60

81 53 60 61

82 61 60 64

83 64 60 66

84 60 63 66

85 60 59 63

86 6 5 24

87 6 24 25

88 25 24 37

89 37 53 61

90 61 64 67

91 67 64 70

92 64 66 70

93 66 63 69

94 7 6 25

95 7 25 38

96 25 37 38

97 38 37 54

98 54 37 61

99 54 61 65

100 65 61 67

101 65 67 71

102 67 70 71

103 66 69 70

104 38 54 62

105 62 54 65

106 62 65 68

107 68 65 71

108 68 71 72

ELEMENT PROPERTIES

I TO 109 TYPE 'CSTG' THICKNESS 0.50

CONSTANTS

POISSON .3 ALL

JOINT RELEASES

1 TO 7 FORCE Y

46 47 55 57 59 63 69 FORCE X

LOADING 'ONE' 'R=0.33'

JOINT LOADS

1 FORCE Y -125.0

8 FORCE Y -250.0

13 FORCE Y -250.

15 FORCE Y -250.

18 FORCE Y -125.

LOADING 'TWO' 'R=0.50'

JOINT LOADS

1 FORCE Y -125.0

8 FORCE Y -250.0

13 FORCE Y -250.

15 FORCE Y -250.

18 FORCE Y -250.

20 FORCE Y -250.

26 FORCE Y -125.

LOADING 'THREE' 'R=0.66'

JOINT LOADS

1 FORCE Y -125.0

8 FORCE Y -250.0

13 FORCE Y -250.

15 FORCE Y -250.

18 FORCE Y -250.

20 FORCE Y -250.

26 FORCE Y -250.

28 FORCE Y -250.

31 FORCE Y -125.

LOADING 'FOUR' 'R=0.83'

1 FORCE Y -125.0

8 FORCE Y -250.0

13 FORCE Y -250.

15 FORCE Y -250.

18 FORCE Y -250.

20 FORCE Y -250.

26 FORCE Y -250.

28 FORCE Y -250.

31 FORCE Y -250.

33 FORCE Y -250.

39 FORCE Y -125.

LOADING 'FIVE' 'R=1.0'

JOINT LOADS

1 FORCE Y -125.0

8 FORCE Y -250.0

13 FORCE Y -250.

15 FORCE Y -250.

18 FORCE Y -250.

20 FORCE Y -250.

26 FORCE Y -250.

28 FORCE Y -250.

31 FORCE Y -250.

33 FORCE Y -250.

39 FORCE Y -250.

41 FORCE Y -250.

44 FORCE Y -125.

STIFFNESS ANALYSIS

LIST DISPLACEMENTS STRESSES ALL

LOADING - ONE

R=0.33

RESULTANT JOINT DISPLACEMENTS - SUPPORTS

JOINT	DISPLACEMENT		
	X DISP.	Y DISP.	Z DISP.
1	0.0	-0.4222690	
2	0.0	-0.4100921	
3	0.0	-0.3945534	
4	0.0	-0.3579448	
5	0.0	-0.3129481	
6	0.0	-0.2819735	
7	0.0	-0.2518885	
46	0.1026106	0.0	
47	0.0960766	0.0	
55	0.0858873	0.0	
57	0.0783217	0.0	
59	0.0739172	0.0	
63	0.0700349	0.0	
69	0.0618424	0.0	

RESULTANT JOINT DISPLACEMENTS - FREE JOINTS

JOINT	DISPLACEMENT		
	X DISP.	Y DISP.	Z DISP.
8	0.0208431	-0.4164734	
9	0.0073571	-0.4093118	
10	0.0207590	-0.3981020	
11	0.0108859	-0.3816763	
12	-0.0002322	-0.3503858	
13	0.0398991	-0.4012147	
14	0.0322695	-0.3779386	
15	0.0576743	-0.3758704	
16	0.0423164	-0.3461661	
17	0.0207044	-0.3344870	
18	0.0719678	-0.3319695	
19	0.0509313	-0.3058933	
20	0.0808291	-0.2842578	
21	0.0618282	-0.2685195	
22	0.0381340	-0.2694951	
23	0.0102026	-0.2666142	
24	-0.0152860	-0.2525315	
25	-0.0326511	-0.2239708	
26	0.0864744	-0.2517479	
27	0.0688493	-0.2382060	
28	0.0919099	-0.2221598	
29	0.0742089	-0.2083761	
30	0.0489415	-0.2098475	
31	0.0964963	-0.1925613	
32	0.0779532	-0.1782787	
33	0.0999738	-0.1625798	
34	0.0800425	-0.1475771	

35	0.0551697	-0.1487693
36	0.0192374	-0.1536883
37	-0.0281002	-0.1740059
38	-0.0761210	-0.1740729
39	0.1025355	-0.1307027
40	0.0794247	-0.1131014
41	0.1027887	-0.0937753
42	0.0779205	-0.0726691
43	0.0554330	-0.0820109
44	0.0953897	-0.0412979
45	0.0961393	-0.0242994
48	0.0883888	-0.0199576
49	0.0783137	-0.0340411
50	0.0811015	-0.0126461
51	0.0671102	-0.0271538
52	0.0423949	-0.0533026
53	0.0070710	-0.0895838
54	-0.0536738	-0.1160896
56	0.0785494	-0.0080547
58	0.0705171	-0.0131675
60	0.0565080	-0.0161413
61	-0.0138081	-0.0538263
62	-0.0924131	-0.0684252
64	0.0293295	-0.0113002
65	-0.0463891	-0.0210745
66	0.0541091	0.0064169
67	-0.0056101	0.0144127
68	-0.0836563	0.0156761
70	0.0277361	0.0345493
71	-0.0442713	0.0503002
72	-0.0828232	0.0511333

LOADING - TWC

R=0.50

RESULTANT JOINT DISPLACEMENTS - SUPPORTS

JOINT	/-----DISPLACEMENT-----/		
	X DISP.	Y DISP.	Z DISP.
1	0.0	-0.5600443	
2	0.0	-0.5487175	
3	0.0	-0.5341160	
4	0.0	-0.4968480	
5	0.0	-0.4441767	
6	0.0	-0.4043831	
7	0.0	-0.3635858	
46	0.1505420	0.0	
47	0.1407731	0.0	
55	0.1255132	0.0	
57	0.1142317	0.0	
59	0.1077142	0.0	
63	0.1020182	0.0	
69	0.0901737	0.0	

RESULTANT JOINT DISPLACEMENTS - FREE JOINTS

JOINT	/-----DISPLACEMENT-----/		
	X DISP.	Y DISP.	Z DISP.

8	0.0240092	-0.5548770
9	0.0093671	-0.5480538
10	0.0269979	-0.5381193
11	0.0174835	-0.5225071
12	0.0041475	-0.4909914
13	0.0461366	-0.5419893
14	0.0436655	-0.5219635
15	0.0673773	-0.5223386
16	0.0591403	-0.4982472
17	0.0367852	-0.4823679
18	0.0875527	-0.4951345
19	0.0727232	-0.4666215
20	0.1068258	-0.4590085
21	0.0847532	-0.4245791
22	0.0541643	-0.4139409
23	0.0166546	-0.3961638
24	-0.0192985	-0.3681605
25	-0.0465881	-0.3250688
26	0.1234638	-0.4041317
27	0.0941743	-0.3718528
28	0.1345595	-0.3424063
29	0.1051054	-0.3185824
30	0.0663843	-0.3199648
31	0.1413316	-0.2929317
32	0.1118622	-0.2703214
33	0.1464692	-0.2456812
34	0.1157232	-0.2225107
35	0.0779863	-0.2242221
36	0.0257905	-0.2310290
37	-0.0396974	-0.2544971
38	-0.1096689	-0.2538066
39	0.1502070	-0.1967560
40	0.1151652	-0.1701306
41	0.1506339	-0.1409023
42	0.1132060	-0.1091548
43	0.0793526	-0.1232304
44	0.1396593	-0.0619599
45	0.1408163	-0.0364460
48	0.1291828	-0.0299026
49	0.1140135	-0.0510181
50	0.1183174	-0.0187874
51	0.0973543	-0.0403723
52	0.0607115	-0.0792472
53	0.0090405	-0.1325048
54	-0.0775533	-0.1698971
56	0.1145430	-0.0119375
58	0.1026067	-0.0195358
60	0.0818811	-0.0238971
61	-0.0204292	-0.0796427
62	-0.1341198	-0.1005465
64	0.0425663	-0.0170955
65	-0.0675377	-0.0317291
66	0.0788043	0.0091050
67	-0.0081999	0.0203308
68	-0.1218780	0.0219496
70	0.0404238	0.0499531
71	-0.0644552	0.0726295
72	-0.1206980	0.0738095

LOADING - THREE

R=0.66

RESULTANT JOINT DISPLACEMENTS - SUPPORTS

	X DISP.	Y DISP.	Z DISP.
1	0.0	-0.6690674	
2	0.0	-0.6583131	
3	0.0	-0.6444228	
4	0.0	-0.6077477	
5	0.0	-0.5519304	
6	0.0	-0.5075577	
7	0.0	-0.4591680	
46	0.1948645	0.0	
47	0.1818138	0.0	
55	0.1614171	0.0	
57	0.1464503	0.0	
59	0.1379033	0.0	
63	0.1304640	0.0	
69	0.1154167	0.0	

RESULTANT JOINT DISPLACEMENTS - FREE JOINTS

JOINT	/-----DISPLACEMENT-----/		
	X DISP.	Y DISP.	Z DISP.
8	0.0262737	-0.6642418	
9	0.0107030	-0.6576943	
10	0.0310741	-0.6484298	
11	0.0220581	-0.6334952	
12	0.0080292	-0.6030513	
13	0.0507154	-0.6523982	
14	0.0506972	-0.6337957	
15	0.0744208	-0.6346063	
16	0.0694405	-0.6124594	
17	0.0482997	-0.5971370	
18	0.0971520	-0.6106579	
19	0.0870937	-0.5853758	
20	0.1197341	-0.5799558	
21	0.1036490	-0.5503640	
22	0.0703990	-0.5356945	
23	0.0253100	-0.5081715	
24	-0.0203677	-0.4678668	
25	-0.0580115	-0.4127446	
26	0.1420336	-0.5399609	
27	0.1173831	-0.5038961	
28	0.1626024	-0.4876006	
29	0.1284924	-0.4438896	
30	0.0816264	-0.4329308	
31	0.1788607	-0.4144000	
32	0.1367357	-0.3726301	
33	0.1883602	-0.3350195	
34	0.1453409	-0.3018763	
35	0.0957052	-0.3037682	
36	0.0301653	-0.3081198	
37	-0.0487367	-0.3264007	
38	-0.1380879	-0.3240821	
39	0.1937232	-0.2659858	
40	0.1459865	-0.2296998	
41	0.1947548	-0.1895981	
42	0.1441357	-0.1465153	
43	0.0985267	-0.1652556	
44	0.1802178	-0.0829486	
45	0.1818098	-0.0487640	
48	0.1661752	-0.0398991	

49	0.1457031	-0.0681182
50	0.1517542	-0.0246995
51	0.1237822	-0.0531682
52	0.0759425	-0.1043742
53	0.0094247	-0.1726443
54	-0.0980603	-0.2180954
56	0.1468159	-0.0156338
58	0.1311033	-0.0256419
60	0.1039504	-0.0311577
61	-0.0267071	-0.1037567
62	-0.1704425	-0.1297920
64	0.0541130	-0.0228660
65	-0.0862468	-0.0422421
66	0.1006991	0.0112519
67	-0.0105390	0.0248812
68	-0.1557252	0.0265541
70	0.0516888	0.0632212
71	-0.0822977	0.0917142
72	-0.1542785	0.0931610

LOADING - FOUR

R=0.83

RESULTANT JOINT DISPLACEMENTS - SUPPORTS

JOINT	DISPLACEMENT		
	X DISP.	Y DISP.	Z DISP.
1	0.0	-0.7494617	
2	0.0	-0.7390816	
3	0.0	-0.7256556	
4	0.0	-0.6896070	
5	0.0	-0.6329264	
6	0.0	-0.5868462	
7	0.0	-0.5335010	
46	0.2335960	0.0	
47	0.2171218	0.0	
55	0.1915357	0.0	
57	0.1730714	0.0	
59	0.1627676	0.0	
63	0.1537723	0.0	
69	0.1361064	0.0	

RESULTANT JOINT DISPLACEMENTS - FREE JOINTS

JOINT	DISPLACEMENT		
	X DISP.	Y DISP.	Z DISP.
8	0.0279324	-0.7447788	
9	0.0115967	-0.7384920	
10	0.0337960	-0.7294983	
11	0.0249134	-0.7150527	
12	0.0107061	-0.6854775	
13	0.0541028	-0.7333300	
14	0.0553188	-0.7154046	
15	0.0796946	-0.7160934	
16	0.0761152	-0.6946969	
17	0.0551953	-0.6800324	
18	0.1044236	-0.6927757	
19	0.0959952	-0.6683278	

20	0.1289736	-0.6628358
21	0.1150101	-0.6343141
22	0.0816811	-0.6199796
23	0.0326975	-0.5916207
24	-0.0192568	-0.5448480
25	-0.0664879	-0.4817865
26	0.1529328	-0.6247098
27	0.1321822	-0.5911837
28	0.1754353	-0.5772567
29	0.1469604	-0.5383189
30	0.0985615	-0.5226662
31	0.1959851	-0.5197136
32	0.1583165	-0.4745001
33	0.2142721	-0.4506275
34	0.1660358	-0.3975611
35	0.1090916	-0.3877259
36	0.0348133	-0.3784750
37	-0.0550826	-0.3851390
38	-0.1598517	-0.3805491
39	0.2291063	-0.3568709
40	0.1662737	-0.2993236
41	0.2333664	-0.2435405
42	0.1671818	-0.1864285
43	0.1097060	-0.2091449
44	0.2149425	-0.1048596
45	0.2170081	-0.0615856
48	0.1970206	-0.0501070
49	0.1706110	-0.0856854
50	0.1792170	-0.0302704
51	0.1442784	-0.0654070
52	0.0871217	-0.1283586
53	0.0088350	-0.2074690
54	-0.1140997	-0.2577023
56	0.1733842	-0.0190845
58	0.1542844	-0.0314494
60	0.1213754	-0.0376382
61	-0.0321311	-0.1246034
62	-0.1992714	-0.1543455
64	0.0632851	-0.0282768
65	-0.1013855	-0.0518897
66	0.1185239	0.0127600
67	-0.0124751	0.0278226
68	-0.1831614	0.0292922
70	0.0608798	0.0736052
71	-0.0967325	0.1064537
72	-0.1815396	0.1080755

LOADING - FIVE

R=1.0

RESULTANT JOINT DISPLACEMENTS - SUPPORTS

JOINT	/-----DISPLACEMENT-----/		
	X DISP.	Y DISP.	Z DISP.
1	0.0	-0.7942944	
2	0.0	-0.7841097	
3	0.0	-0.7709457	
4	0.0	-0.7352850	
5	0.0	-0.6786975	
6	0.0	-0.6324254	
7	0.0	-0.5766222	
46	0.2635514	0.0	

47	0.2422870	0.0
55	0.2115248	0.0
57	0.1901097	0.0
59	0.1784519	0.0
63	0.1683040	0.0
69	0.1489339	0.0

RESULTANT JOINT DISPLACEMENTS - FREE JOINTS

JOINT	/-----DISPLACEMENT-----/		
	X DISP.	Y DISP.	Z DISP.
8	0.0288491	-0.7896380	
9	0.0120651	-0.7835274	
10	0.0352106	-0.7745833	
11	0.0263349	-0.7604063	
12	0.0120116	-0.7313383	
13	0.0559538	-0.7782650	
14	0.0576967	-0.7605954	
15	0.0825282	-0.7611200	
16	0.0795026	-0.7399804	
17	0.0585795	-0.7256600	
18	0.1082651	-0.7378531	
19	0.1004301	-0.7136446	
20	0.1337456	-0.7079982	
21	0.1204978	-0.6797959	
22	0.0872757	-0.6656661	
23	0.0367262	-0.6375340	
24	-0.0177071	-0.5890751	
25	-0.0711747	-0.5222666	
26	0.1585137	-0.6702769	
27	0.1388943	-0.6374140	
28	0.1818314	-0.6238536	
29	0.1551004	-0.5859995	
30	0.1073206	-0.5703622	
31	0.2031870	-0.5685631	
32	0.1685314	-0.5255780	
33	0.2229666	-0.5037158	
34	0.1785624	-0.4542704	
35	0.1189623	-0.4402923	
36	0.0395791	-0.4228089	
37	-0.0584130	-0.4206473	
38	-0.1721844	-0.4143061	
39	0.2417359	-0.4225258	
40	0.1799642	-0.3585145	
41	0.2526314	-0.3133646	
42	0.1780539	-0.2320154	
43	0.1145702	-0.2473329	
44	0.2361735	-0.1374790	
45	0.2414064	-0.0793581	
48	0.2158509	-0.0607442	
49	0.1823270	-0.1041241	
50	0.1961287	-0.0348872	
51	0.1557552	-0.0760680	
52	0.0925859	-0.1469355	
53	0.0084143	-0.2302537	
54	-0.1233627	-0.2819826	
56	0.1902069	-0.0219096	
58	0.1684752	-0.0359211	
60	0.1315160	-0.0421799	
61	-0.0354800	-0.1381562	
62	-0.2162156	-0.1697792	
64	0.0687336	-0.0321629	

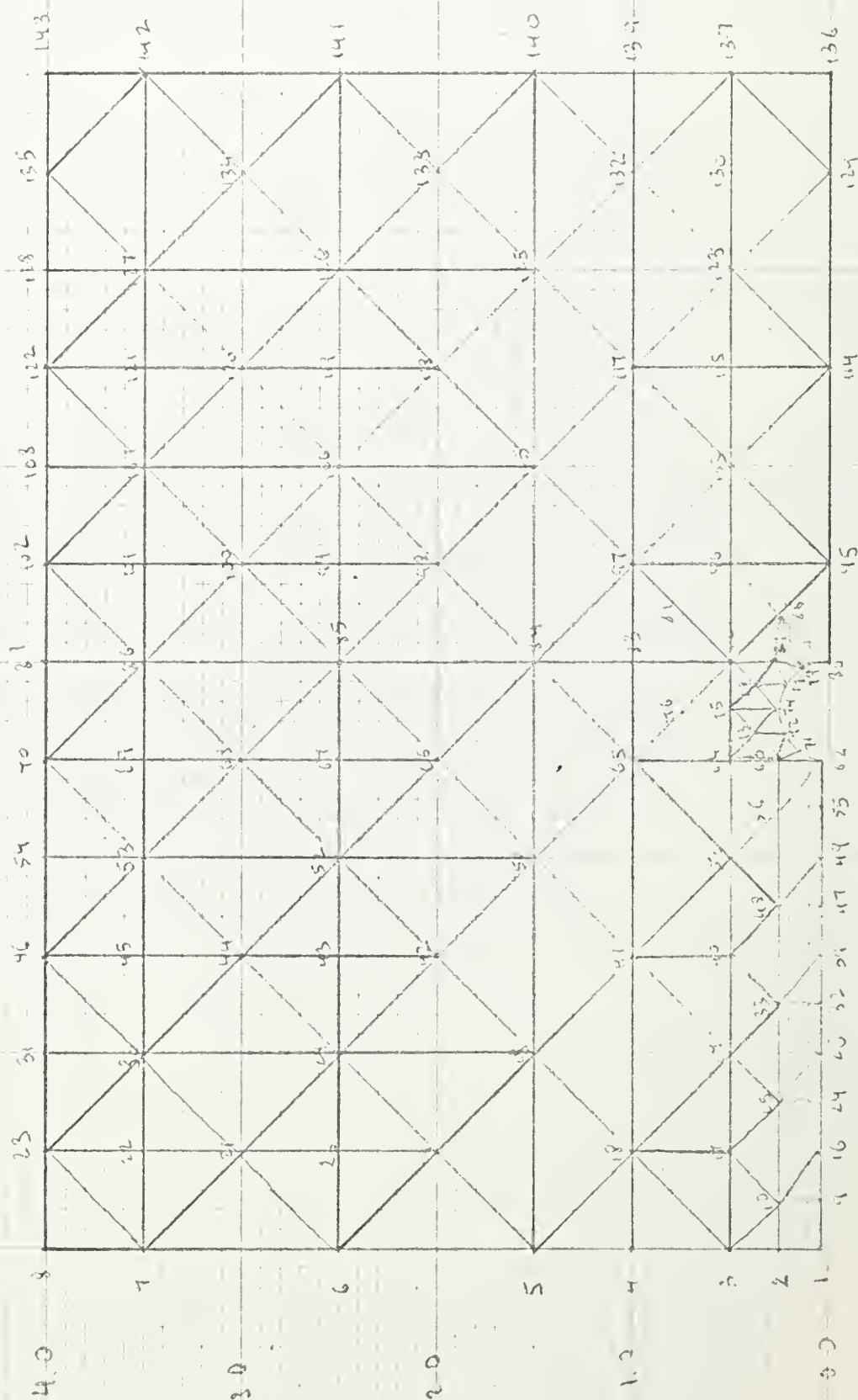
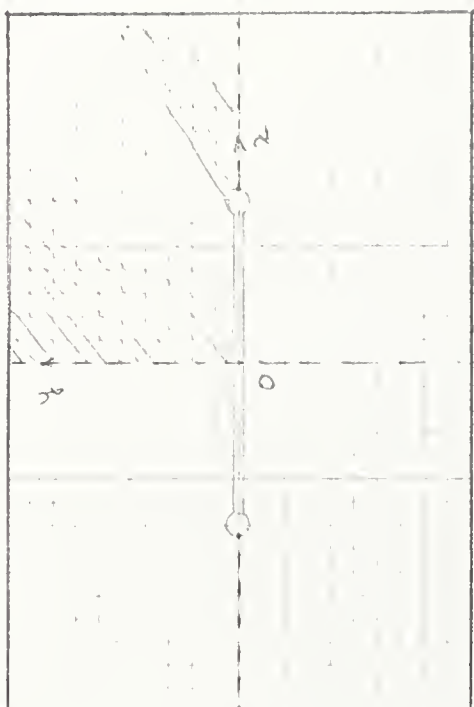
65	-0.1104512	-0.0585339
66	0.1254749	0.0135181
67	-0.0136140	0.0290288
68	-0.1996817	0.0302217
70	0.0665646	0.0796388
71	-0.1053854	0.1148155
72	-0.1979838	0.1165134

APPENDIX 4

Straight slit with circled ends , 'CSTG' type .

The following presents ;

- 1- Plate division , the numbers are node names , page 141 .
- 2- Input data , pp 142 - 152 .
- 3- Output data , pp 153 - 163 .



6.0 0.5 0.1 0.0 0.0 0.0 0.0 0.0 0.0 0.0

APPENDIX A STRAIGHT SLIT WITH CIRCLED ENDS

TEST TYPE

TYPE PLANE STRESS

UNITS INCHES

UNITS POUNDS

JOINT COORDINATES

1	0.00	0.02125	C
2	0.00	0.25	C
3	0.00	0.50	C
4	0.00	1.00	C
5	0.00	1.50	C
6	0.00	2.00	C
7	0.00	2.50	C
8	0.00	4.00	C
9	0.25	0.02125	
10	0.25	0.25	
11	0.50	0.02125	
12	0.50	0.50	
13	0.50	1.00	
14	0.50	2.00	
15	0.50	2.50	
16	0.50	3.00	
17	0.50	3.50	
18	0.50	4.00	
19	0.75	0.02125	
20	0.75	0.25	
21	1.00	0.02125	

27 1.00 0.50

28 1.00 1.50

29 1.00 2.50

30 1.00 3.50

31 1.00 4.00

32 1.25 0.03125

33 1.25 0.25

39 1.50 0.03125

40 1.50 0.50

41 1.50 1.00

42 1.50 2.00

43 1.50 2.50

44 1.50 3.00

45 1.50 3.50

46 1.50 4.00

47 1.75 0.03125

48 1.75 0.25

49 2.00 0.03125

50 2.00 0.50

51 2.00 1.50

52 2.00 2.50

53 2.00 3.50

54 2.00 4.00

55 2.25 0.03125

56 2.25 0.25

62 2.503 0.03125

63 2.50 0.25

64 2.50 0.50

65 2.50 1.00

66 2.50 2.00

67 2.50 2.50

68 2.50 3.00

69 2.50 3.50

70 2.50 4.00

144

71 2.552 0.15

72 2.640 0.224

73 2.625 0.375

74 2.75 0.25

75 2.75 0.50

76 2.75 0.75

77 2.87 0.22

78 2.875 0.375

79 2.97 0.12

80 3.00 0.00 S

81 3.00 0.25

82 3.00 0.50

83 3.00 1.00

84 3.00 1.50

85 3.00 2.50

86 3.00 3.50

87 3.00 4.00

88 3.25 0.25

89 3.25 0.75

95 3.50 0.00 S

96 3.50 0.50

97 3.50 1.00

98 3.50 2.00

99 3.50 2.50

100 3.50 3.00

101 3.50 3.50

102 3.50 4.00

103 4.00 0.50

105 4.00 1.50

106 4.00 2.50

107 4.00 3.50

108 4.00 4.00

100

114 4.50 0.00 S

145

115 4.50 0.50

117 4.50 1.00

118 4.50 2.00

119 4.50 2.50

120 4.50 3.00

121 4.50 3.50

122 4.50 4.00

123 5.00 0.50

125 5.00 1.50

126 5.00 2.50

127 5.00 3.50

128 5.00 4.00

129 5.50 0.00 S

130 5.50 0.50

132 5.50 1.00

133 5.50 2.00

134 5.50 3.00

135 5.50 4.00

136 6.00 0.00 S

137 6.00 0.50

139 6.00 1.00

140 6.00 1.50

141 6.00 2.50

142 6.00 3.50

143 6.00 4.00

ELEMENT INCIDENCES

1 2 1 10

2 1 9 10

3 10 9 16

4 10 16 25

5 16 24 25

6 25 24 26

105

7 25 26 33

8 26 32 33

9 33 32 39

10 33 39 48

11 39 47 48

12 48 47 49

13 48 49 56

14 49 55 56

15 56 55 62

16 56 62 63

17 63 62 71

18 63 71 72

19 63 72 73

20 73 72 74

21 73 74 75

22 75 74 78

23 74 77 78

24 78 77 81

25 77 79 81

26 81 79 88

27 79 80 88

28 80 95 88

29 3 2 10

30 3 10 17

31 10 25 17

32 17 25 27

33 25 33 27

34 27 33 40

35 33 48 40

36 40 48 50

37 48 56 50

38 50 56 64

39 56 63 64

40 64 63 73

41 64 73 75

42 75 78 82

43 78 81 82

44 82 81 88

45 82 88 96

46 88 95 96

47 4 3 18

48 3 17 18

49 18 17 27

50 18 27 41

51 27 40 41

52 41 40 50

53 41 50 65

54 50 64 65

55 65 64 76

56 64 75 76

57 76 75 82

58 65 76 83

59 76 82 83

60 83 82 89

61 82 96 89

62 83 89 97

63 89 96 97

64 97 96 103

65 96 95 103

66 97 103 117

67 95 114 103

68 103 115 117

69 103 114 115

70 117 115 123

71 115 114 123

72 117 123 132

73 114 129 123

74 123 130 132

75 123 129 130

76 132 130 137

77 130 129 137

78 132 137 139

79 129 136 137

80 5 4 18

81 5 18 28

82 18 41 28

83 28 41 51

84 41 65 51

85 51 65 84

86 65 83 84

87 84 83 97

88 84 97 105

89 97 117 105

90 105 117 125

91 117 132 125

92 125 132 140

93 132 139 140

94 6 5 19

95 5 28 19

96 19 28 29

97 6 19 20

98 20 19 29

99 29 28 42

100 29 42 43

101 43 42 52

102 28 51 42

103 42 51 52

104 52 51 66

105 52 66 67

106 67 66 85

107 51 84 66

108 66 84 85

109 85 84 98

110 85 98 99

111 99 98 106

112 84 105 98

113 98 105 106

114 106 105 118

115 106 118 119

116 119 118 126

117 105 125 118

118 118 125 126

119 126 125 133

120 126 133 141

121 125 140 133

122 133 140 141

123 7 6 21

124 7 21 22

125 6 20 21

126 22 21 30

127 21 20 29

128 21 29 30

129 30 29 44

130 30 44 45

131 29 43 44

132 45 44 53

133 44 43 52

134 44 52 53

135 53 52 68

136 53 68 69

137 52 67 68

138 69 68 86

139 68 85 86

140 68 67 85

141 86 85 100

142 86 100 101

143 85 99 100

144 101 100 107

145 100 99 106

146 100 106 107

147 107 106 120

148 107 120 121

149 106 119 120

150 121 120 127

151 120 119 126

152 120 126 127

153 127 126 134

154 127 134 142

155 126 141 134

156 134 141 142

157 8 7 23

158 7 22 23

159 23 22 30

160 23 30 31

161 31 30 46

162 30 45 46

163 46 45 53

164 46 53 54

165 54 53 70

166 53 69 70

167 70 69 86

168 70 86 87

169 87 86 102

170 86 101 102

171 102 101 107

172 102 107 108

173 108 107 122

174 107 121 122

175 122 121 127

176 122 127 128

177 128 127 135

178 127 142 135

179 135 142 143

ELEMENT PROPERTIES

1 TO 179 TYPE 'CSTG' THICKNESS 0.10

CONSTANTS

E 30000. ALL

POISSON 0.3 ALL

JOINT RELEASES

1 TO 8 FORCE Y

80 95 114 129 136 FORCE X

\$ PLATE LENGTH LO=12, WIDTH WO=8, WELD WIDTH W=1/16, WELD LENGTH CENTER

\$ TO CENTER L=5.5, END CIRCLE DIAMETER=0.50, SAW CUT WIDTH WS=1/32,

\$ SIGMA0=8*10**4

LOADING 'ONE' 'X=0.20'

JOINT LOADS

1 FORCE Y -1.00

9 FORCE Y -2.00

16 FORCE Y -1.00

LOADING 'TWO' 'X=0.40'

JOINT LOADS

1 FORCE Y -1.00

9 FORCE Y -2.00

16 FORCE Y -2.00

24 FORCE Y -2.00

26 FORCE Y -1.00

LOADING 'THREE' 'X=0.60'

JOINT LOADS

1 FORCE Y -1.00

152

9 FORCE Y -2.00

16 FORCE Y -2.00

24 FORCE Y -2.00

26 FORCE Y -2.00

32 FORCE Y -2.00

39 FORCE Y -1.00

LOADING 'FOUR' 'X=0.80'

JOINT LOADS

1 FORCE Y -1.00

9 FORCE Y -2.00

16 FORCE Y -2.00

24 FORCE Y -2.00

26 FORCE Y -2.00

32 FORCE Y -2.00

39 FORCE Y -2.00

47 FORCE Y -2.00

49 FORCE Y -1.00

LOADING 'FIVE' 'X=1.00'

JOINT LOADS

1 FORCE Y -1.00

9 FORCE Y -2.00

16 FORCE Y -2.00

24 FORCE Y -2.00

26 FORCE Y -2.00

32 FORCE Y -2.00

39 FORCE Y -2.00

47 FORCE Y -2.00

49 FORCE Y -2.00

55 FORCE Y -2.00

62 FORCE Y -1.00

DUMP TIME

TIME BEGIN

152

LOADING - ONE

X=0.20

RESULTANT JOINT DISPLACEMENTS - SUPPORTS

JOINT	DISPLACEMENT		
	X DISP.	Y DISP.	Z DISP.
1	0.0	-0.0086755	
2	0.0	-0.0082036	
3	0.0	-0.0078239	
4	0.0	-0.0070758	
5	0.0	-0.0066254	
6	0.0	-0.0058597	
7	0.0	-0.0055113	
8	0.0	-0.0053223	
80	0.0017814	0.0	
95	0.0016919	0.0	
114	0.0014933	0.0	
129	0.0013662	0.0	
136	0.0012693	0.0	

RESULTANT JOINT DISPLACEMENTS - FREE JOINTS

JOINT	DISPLACEMENT		
	X DISP.	Y DISP.	Z DISP.
9	0.0005557	-0.0083067	
10	0.0002291	-0.0079604	
16	0.0009274	-0.0074691	
17	0.0002137	-0.0070741	
18	-0.0000497	-0.0066503	
19	-0.0001827	-0.0059258	
20	-0.0002045	-0.0056892	
21	-0.0002943	-0.0055396	
22	-0.0003790	-0.0053648	
23	-0.0005535	-0.0052567	
24	0.0012744	-0.0065069	
25	0.0007213	-0.0065401	
26	0.0014718	-0.0058308	
27	0.0005111	-0.0058841	
28	-0.0001555	-0.0056535	
29	-0.0003852	-0.0052698	
30	-0.0007266	-0.0050276	
31	-0.0010494	-0.0048734	
32	0.0016362	-0.0052131	
33	0.0011581	-0.0052435	
39	0.0017694	-0.0046604	
40	0.0008691	-0.0047322	
41	0.0002667	-0.0047954	
42	-0.0003452	-0.0046974	
43	-0.0004992	-0.0046137	
44	-0.0007598	-0.0045643	
45	-0.0010134	-0.0044638	
46	-0.0014693	-0.0043937	

47	0.0018968	-0.0041231
48	0.0014432	-0.0041555
49	0.0020039	-0.0035730
50	0.0010720	-0.0036380
51	-0.0000325	-0.0037827
52	-0.0005760	-0.0038597
53	-0.0012293	-0.0038132
54	-0.0017601	-0.0037361
55	0.0020906	-0.0030127
56	0.0016213	-0.0030352
62	0.0021477	-0.0024177
63	0.0016731	-0.0024355
64	0.0011764	-0.0024674
65	0.0005213	-0.0026032
66	-0.0002759	-0.0029503
67	-0.0005766	-0.0030299
68	-0.0009712	-0.0030872
69	-0.0013669	-0.0030747
70	-0.0019528	-0.0030519
71	0.0018989	-0.0023002
72	0.0017520	-0.0020467
73	0.0014234	-0.0020899
74	0.0016656	-0.0016660
75	0.0011952	-0.0017458
76	0.0008661	-0.0018929
77	0.0016692	-0.0011422
78	0.0013886	-0.0012558
79	0.0016642	-0.0004526
81	0.0015838	-0.0006717
82	0.0012462	-0.0010315
83	0.0007027	-0.0015287
84	0.0002286	-0.0018316
85	-0.0005444	-0.0022636
86	-0.0014379	-0.0023653
87	-0.0020281	-0.0023572
88	0.0016225	-0.0003506
89	0.0010666	-0.0009416
96	0.0013840	-0.0004082
97	0.0008943	-0.0008228
98	-0.0000371	-0.0014264
99	-0.0004874	-0.0015585
100	-0.0009653	-0.0016495
101	-0.0014567	-0.0016839
102	-0.0020403	-0.0016910
103	0.0014261	-0.0002010
105	0.0005453	-0.0006334
106	-0.0004208	-0.0009711
107	-0.0014433	-0.0010809
108	-0.0020034	-0.0010996
115	0.0013505	-0.0000758
117	0.0010433	-0.0001484
118	0.0001464	-0.0003826
119	-0.0003745	-0.0004566
120	-0.0008872	-0.0005075
121	-0.0014202	-0.0005336
122	-0.0019571	-0.0005439
123	0.0013325	0.0000399
125	0.0006534	0.0000422
126	-0.0003311	-0.0000085
127	-0.0013957	-0.0000317
128	-0.0019226	-0.0000395
130	0.0012543	0.0001340
132	0.0010208	0.0002553
133	0.0001835	0.0004062
134	-0.0008477	0.0004573
135	-0.0019035	0.0004661

137	0.0012187	0.0002641
139	0.0009476	0.0004913
140	0.0006054	0.0006691
141	-0.0003281	0.0008972
142	-0.0013805	0.0009667
143	-0.0018995	0.0009702

LOADING - TWO

X=0.40

RESULTANT JOINT DISPLACEMENTS - SUPPORTS

JOINT	DISPLACEMENT		
	X DISP.	Y DISP.	Z DISP.
1	0.0	-0.0151012	
2	0.0	-0.0146947	
3	0.0	-0.0143387	
4	0.0	-0.0133415	
5	0.0	-0.0127092	
6	0.0	-0.0113659	
7	0.0	-0.0107165	
8	0.0	-0.0103543	
80	0.0034995	0.0	
95	0.0033222	0.0	
114	0.0029303	0.0	
129	0.0026812	0.0	
136	0.0024917	0.0	

RESULTANT JOINT DISPLACEMENTS - FREE JOINTS

JOINT	DISPLACEMENT		
	X DISP.	Y DISP.	Z DISP.
9	0.0007839	-0.0148300	
10	0.0005129	-0.0145293	
16	0.0014993	-0.0143104	
17	0.0005640	-0.0135479	
18	0.0000711	-0.0128202	
19	-0.0003118	-0.0114891	
20	-0.0003825	-0.0110490	
21	-0.0005600	-0.0107711	
22	-0.0007291	-0.0104380	
23	-0.0010632	-0.0102326	
24	0.0021774	-0.0134848	
25	0.0013916	-0.0131850	
26	0.0026910	-0.0121029	
27	0.0010081	-0.0117723	
28	-0.0002298	-0.0110299	
29	-0.0007277	-0.0102682	
30	-0.0014003	-0.0098004	
31	-0.0020206	-0.0095018	
32	0.0031542	-0.0106014	
33	0.0021583	-0.0106590	
39	0.0034535	-0.0094169	
40	0.0016498	-0.0095367	
41	0.0005042	-0.0095675	
42	-0.0006418	-0.0092010	
43	-0.0009539	-0.0090272	
44	-0.0014622	-0.0089240	

	45	-0.0019590	-0.0087250
1	46	-0.0028367	-0.0085870
	47	0.0037241	-0.0082844
2	48	0.0027935	-0.0083477
	49	0.0039416	-0.0071571
3	50	0.0020568	-0.0072838
	51	-0.0000811	-0.0075158
4	52	-0.0011113	-0.0075843
	53	-0.0023843	-0.0074752
	54	-0.0034105	-0.0073214
	55	0.0041166	-0.0060183
6	56	0.0031678	-0.0060622
	62	0.0042304	-0.0048188
7	63	0.0032760	-0.0048557
	64	0.0022834	-0.0049191
	65	0.0009915	-0.0051860
8	66	-0.0005574	-0.0058390
	67	-0.0011262	-0.0058767
9	68	-0.0018920	-0.0060770
	69	-0.0026595	-0.0060464
0	70	-0.0037968	-0.0059993
1	71	0.0037299	-0.0045838
	72	0.0034359	-0.0040770
2	73	0.0027794	-0.0041640
	74	0.0032651	-0.0033173
3	75	0.0023268	-0.0034769
	76	0.0016752	-0.0037697
4	77	0.0032742	-0.0022734
	78	0.0027145	-0.0024996
5	79	0.0032660	-0.0009005
	81	0.0031049	-0.0013364
6	82	0.0024320	-0.0020521
	83	0.0013565	-0.0030386
7	84	0.0004252	-0.0036344
	85	-0.0010721	-0.0044760
8	86	-0.0028054	-0.0046649
	87	-0.0039553	-0.0046452
9	88	0.0031834	-0.0006969
	89	0.0020792	-0.0018719
0	96	0.0027104	-0.0008109
	97	0.0017405	-0.0016368
1	98	-0.0000853	-0.0028302
	99	-0.0009611	-0.0030884
2	100	-0.0018924	-0.0032659
	101	-0.0028484	-0.0033307
3	102	-0.0039891	-0.0033430
	103	0.0027961	-0.0003999
4	105	0.0010593	-0.0012608
	106	-0.0008308	-0.0019313
5	107	-0.0028267	-0.0021470
	108	-0.0039237	-0.0021818
6	115	0.0026483	-0.0001529
	117	0.0020424	-0.0002991
7	118	0.0002820	-0.0007689
	119	-0.0007384	-0.0009167
8	120	-0.0017415	-0.0010183
	121	-0.0027841	-0.0010696
9	122	-0.0038376	-0.0010894
	123	0.0026137	0.0000752
	125	0.0012785	0.0000724
	126	-0.0006520	-0.0000339
1	127	-0.0027377	-0.0000819
	128	-0.0037719	-0.0000971
2	130	0.0024611	0.0002599
	132	0.0020017	0.0004948
	133	0.0003583	0.0007841

1	134	-0.0016639	0.0008719
	135	-0.0037352	0.0008963
	137	0.0023921	0.0005157
2	139	0.0018591	0.0009584
	140	0.0011871	0.0013040
3	141	-0.0006444	0.0017462
	142	-0.0027086	0.0018790
4	143	-0.0037275	0.0018867

LOADING - THREE

X=0.60

RESULTANT JOINT DISPLACEMENTS - SUPPORTS

JOINT		DISPLACEMENT		
		X DISP.	Y DISP.	Z DISP.
	1	0.0	-0.0202986	
1	2	0.0	-0.0199403	
	3	0.0	-0.0196314	
2	4	0.0	-0.0186197	
	5	0.0	-0.0179556	
3	6	0.0	-0.0162740	
	7	0.0	-0.0153912	
4	8	0.0	-0.0148808	
	80	0.0050955	0.0	
5	95	0.0048344	0.0	
	114	0.0042605	0.0	
6	129	0.0038987	0.0	
	136	0.0036246	0.0	

RESULTANT JOINT DISPLACEMENTS - FREE JOINTS

JOINT		DISPLACEMENT		
		X DISP.	Y DISP.	Z DISP.
	9	0.0009406	-0.0200500	
12	10	0.0006927	-0.0197869	
	16	0.0018248	-0.0195905	
13	17	0.0008964	-0.0188825	
	18	0.0002702	-0.0181233	
14	19	-0.0003718	-0.0164386	
	20	-0.0005213	-0.0158433	
15	21	-0.0007814	-0.0154684	
	22	-0.0010316	-0.0150027	
16	23	-0.0015021	-0.0147101	
	24	0.0026794	-0.0188715	
17	25	0.0019741	-0.0185984	
	26	0.0034844	-0.0178546	
18	27	0.0016314	-0.0171300	
	28	-0.0001944	-0.0158856	
19	29	-0.0010039	-0.0147830	
	30	-0.0019862	-0.0141194	
20	31	-0.0028629	-0.0136935	
	32	0.0042462	-0.0165325	
31	33	0.0030331	-0.0162534	
	39	0.0048382	-0.0146572	
32	40	0.0023308	-0.0144031	
	41	0.0007714	-0.0141486	
	42	-0.0008574	-0.0133323	

	43	-0.0013345	-0.0130647
1	44	-0.0020685	-0.0129050
	45	-0.0027893	-0.0126138
2	46	-0.0040336	-0.0124133
	47	0.0053890	-0.0126354
3	48	0.0039242	-0.0127262
	49	0.0057469	-0.0108264
4	50	0.0028608	-0.0109711
	51	-0.0001246	-0.0110854
	52	-0.0015752	-0.0110331
	53	-0.0034092	-0.0108492
6	54	-0.0048714	-0.0106215
	55	0.0060181	-0.0090289
7	56	0.0045528	-0.0090384
	62	0.0061854	-0.0071927
8	63	0.0047331	-0.0072536
	64	0.0032493	-0.0073499
9	65	0.0013685	-0.0077345
	66	-0.0008290	-0.0085799
0	67	-0.0016211	-0.0087458
	68	-0.0027189	-0.0088690
1	69	-0.0038187	-0.0088134
	70	-0.0054471	-0.0087403
2	71	0.0054235	-0.0068409
	72	0.0049809	-0.0060813
3	73	0.0039990	-0.0062149
	74	0.0047324	-0.0049455
4	75	0.0033316	-0.0051854
	76	0.0023739	-0.0056214
5	77	0.0047531	-0.0033870
	78	0.0039162	-0.0037249
6	79	0.0047465	-0.0013406
	81	0.0045035	-0.0019895
7	82	0.0034994	-0.0030551
	83	0.0019190	-0.0045163
8	84	0.0005681	-0.0053844
	85	-0.0015601	-0.0065760
9	86	-0.0040432	-0.0068231
	87	-0.0056978	-0.0067920
10	88	0.0046255	-0.0010355
	89	0.0029886	-0.0027834
11	96	0.0039264	-0.0012042
	97	0.0024965	-0.0024303
12	98	-0.0001514	-0.0041865
	99	-0.0014043	-0.0045553
13	100	-0.0027448	-0.0048086
	101	-0.0041179	-0.0048967
14	102	-0.0057665	-0.0049111
	103	0.0040597	-0.0005953
15	105	0.0015152	-0.0018743
	106	-0.0012179	-0.0028644
16	107	-0.0040962	-0.0031761
	108	-0.0056862	-0.0032225
17	115	0.0038459	-0.0002315
	117	0.0029580	-0.0004525
18	118	0.0003979	-0.0011583
	119	-0.0010807	-0.0013731
19	120	-0.0025323	-0.0015295
	121	-0.0040404	-0.0016035
	122	-0.0055710	-0.0016314
	123	0.0037977	0.0001024
11	125	0.0018500	0.0000819
	126	-0.0009531	-0.0000876
17	127	-0.0039766	-0.0001625
	128	-0.0054800	-0.0001840
	130	0.0035772	0.0003711

1	132	0.0029067	0.0007058
	133	0.0005169	0.0011111
	134	-0.0024194	0.0012404
2	135	-0.0054286	0.0012624
	137	0.0034790	0.0007439
3	139	0.0027017	0.0013808
	140	0.0017236	0.0018758
4	141	-0.0009379	0.0025061
	142	-0.0039361	0.0026935
	143	-0.0054178	0.0027042

LOADING - FOUR

X=0.80

RESULTANT JOINT DISPLACEMENTS - SUPPORTS

	JOINT	/-----DISPLACEMENT-----/		
		X DISP.	Y DISP.	Z DISP.
1	1	0.0	-0.0244147	
2	2	0.0	-0.0240904	
	3	0.0	-0.0238209	
3	4	0.0	-0.0228374	
	5	0.0	-0.0221868	
4	6	0.0	-0.0203627	
	7	0.0	-0.0193178	
5	8	0.0	-0.0186908	
	80	0.0065100	0.0	
6	95	0.0061686	0.0	
	114	0.0054280	0.0	
7	129	0.0049665	0.0	
	136	0.0046197	0.0	

RESULTANT JOINT DISPLACEMENTS - FREE JOINTS

	JOINT	/-----DISPLACEMENT-----/		
		X DISP.	Y DISP.	Z DISP.
2	9	0.0010618	-0.0241684	
3	10	0.0008188	-0.0239363	
	16	0.0020667	-0.0237171	
4	17	0.0011415	-0.0230710	
	18	0.0004397	-0.0223618	
5	19	-0.0003785	-0.0205501	
	20	-0.0006178	-0.0198514	
6	21	-0.0009501	-0.0194126	
	22	-0.0012730	-0.0188451	
7	23	-0.0018505	-0.0184853	
	24	0.0030363	-0.0230232	
8	25	0.0023627	-0.0227746	
	26	0.0039702	-0.0220878	
9	27	0.0021533	-0.0213924	
	28	-0.0000820	-0.0190638	
10	29	-0.0012030	-0.0185974	
	30	-0.0024569	-0.0177790	
11	31	-0.0035374	-0.0172494	
	32	0.0048848	-0.0208813	
12	33	0.0037392	-0.0206288	
	39	0.0057470	-0.0193380	
	40	0.0030024	-0.0187010	

41	0.0011181	-0.0181525
42	-0.0009803	-0.0168801
43	-0.0016229	-0.0165251
44	-0.0025498	-0.0163125
45	-0.0034636	-0.0159419
46	-0.0050016	-0.0156880
47	0.0065620	-0.0174525
48	0.0048522	-0.0171965
49	0.0071682	-0.0149079
50	0.0035032	-0.0146200
51	-0.0001187	-0.0142730
52	-0.0019432	-0.0140460
53	-0.0042518	-0.0137714
54	-0.0060692	-0.0134774
55	0.0076665	-0.0121742
56	0.0056342	-0.0122458
62	0.0079155	-0.0096045
63	0.0059362	-0.0096949
64	0.0039989	-0.0098115
65	0.0016314	-0.0102026
66	-0.0010567	-0.0110330
67	-0.0020300	-0.0112014
68	-0.0034060	-0.0113295
69	-0.0047845	-0.0112441
70	-0.0068187	-0.0111447
71	0.0068791	-0.0091287
72	0.0062965	-0.0080998
73	0.0049578	-0.0082849
74	0.0059906	-0.0065743
75	0.0041352	-0.0068878
76	0.0029001	-0.0074457
77	0.0060391	-0.0044920
78	0.0049217	-0.0049416
79	0.0060445	-0.0017741
81	0.0057145	-0.0026326
82	0.0043785	-0.0040408
83	0.0023492	-0.0059478
84	0.0006445	-0.0070434
85	-0.0019759	-0.0084718
86	-0.0050878	-0.0087566
87	-0.0071658	-0.0087000
88	0.0058877	-0.0013638
89	0.0037405	-0.0036701
96	0.0049743	-0.0015822
97	0.0031170	-0.0031924
98	-0.0002379	-0.0054542
99	-0.0017932	-0.0059049
100	-0.0034780	-0.0062148
101	-0.0052009	-0.0063164
102	-0.0072822	-0.0063293
103	0.0051617	-0.0007837
105	0.0018858	-0.0024591
106	-0.0015652	-0.0037406
107	-0.0051887	-0.0041297
108	-0.0072034	-0.0041820
115	0.0048910	-0.0003105
117	0.0037469	-0.0006057
118	0.0004860	-0.0015436
119	-0.0013868	-0.0018305
120	-0.0032228	-0.0020280
121	-0.0051281	-0.0021294
122	-0.0070735	-0.0021541
123	0.0048327	0.0001189
125	0.0023405	0.0000654
126	-0.0012214	-0.0001758
127	-0.0050534	-0.0002790

1	128	-0.0069654	-0.0003054
	130	0.0045544	0.0004614
	132	0.0036953	0.0008759
2	133	0.0006517	0.0013659
	134	-0.0030788	0.0015135
3	135	-0.0069034	0.0015383
	137	0.0044325	0.0009377
4	139	0.0034385	0.0017369
	140	0.0021910	0.0023544
	141	-0.0011951	0.0031349
	142	-0.0050048	0.0033630
6	143	-0.0068905	0.0033759

LOADING - FIVE

X=1.00

RESULTANT JOINT DISPLACEMENTS - SUPPORTS

JOINT	DISPLACEMENT		
	X DISP.	Y DISP.	Z DISP.
1	0.0	-0.0274214	
2	0.0	-0.0271190	
3	0.0	-0.0268762	
4	0.0	-0.0259201	
5	0.0	-0.0252945	
6	0.0	-0.0234314	
7	0.0	-0.0222915	
8	0.0	-0.0215839	
80	0.0077067	0.0	
95	0.0072821	0.0	
114	0.0063898	0.0	
129	0.0058441	0.0	
136	0.0054397	0.0	

RESULTANT JOINT DISPLACEMENTS - FREE JOINTS

JOINT	DISPLACEMENT		
	X DISP.	Y DISP.	Z DISP.
9	0.0011461	-0.0271725	
10	0.0009015	-0.0269625	
16	0.0022346	-0.0267184	
17	0.0012983	-0.0261153	
18	0.0005569	-0.0254478	
19	-0.0003654	-0.0236230	
20	-0.0006751	-0.0228694	
21	-0.0010624	-0.0223979	
22	-0.0014423	-0.0217626	
23	-0.0020933	-0.0213563	
24	0.0032873	-0.0260214	
25	0.0026112	-0.0257943	
26	0.0043052	-0.0250864	
27	0.0024800	-0.0244409	
28	0.0000386	-0.0230119	
29	-0.0013232	-0.0215016	
30	-0.0027897	-0.0205796	
31	-0.0040122	-0.0199755	
32	0.0053019	-0.0239905	
33	0.0041704	-0.0236566	

	39	0.0062528	-0.0223857
	40	0.0034966	-0.0217711
	41	0.0014470	-0.0211715
2	42	-0.0010188	-0.0176291
	43	-0.0018087	-0.0192055
3	44	-0.0028834	-0.0189515
	45	-0.0039464	-0.0185211
4	46	-0.0056914	-0.0182270
	47	0.0071536	-0.0205870
	48	0.0055218	-0.0203332
	49	0.0079422	-0.0183751
6	50	0.0041368	-0.0176579
	51	-0.0000418	-0.0168380
7	52	-0.0021946	-0.0164252
	53	-0.0048642	-0.0160729
8	54	-0.0069380	-0.0157253
	55	0.0085746	-0.0158548
9	56	0.0064363	-0.0155228
	62	0.0089579	-0.0128241
10	63	0.0067741	-0.0125142
	64	0.0045203	-0.0123760
11	65	0.0018545	-0.0124309
	66	-0.0012046	-0.0130411
12	67	-0.0023215	-0.0131926
	68	-0.0039087	-0.0133123
3	69	-0.0054993	-0.0131958
	70	-0.0078321	-0.0130725
4	71	0.0078276	-0.0118948
	72	0.0072630	-0.0103808
5	73	0.0056797	-0.0105383
	74	0.0069484	-0.0083265
6	75	0.0046723	-0.0086554
	76	0.0032263	-0.0092298
7	77	0.0070752	-0.0056405
	78	0.0056551	-0.0062055
8	79	0.0071175	-0.0022141
	81	0.0066833	-0.0032830
9	82	0.0050001	-0.0050272
	83	0.0026456	-0.0073037
0	84	0.0006765	-0.0085284
	85	-0.0022838	-0.0100514
1	86	-0.0058746	-0.0103379
	87	-0.0082714	-0.0102587
2	88	0.0069250	-0.0016808
	89	0.0042948	-0.0045269
3	96	0.0058093	-0.0019344
	97	0.0035745	-0.0038999
4	98	-0.0003256	-0.0065647
	99	-0.0020942	-0.0070612
5	100	-0.0040412	-0.0074034
	101	-0.0060293	-0.0075079
6	102	-0.0084436	-0.0075159
	103	0.0060597	-0.0009577
7	105	0.0021622	-0.0029911
	106	-0.0018421	-0.0045118
8	107	-0.0060347	-0.0049536
	108	-0.0083819	-0.0050054
9	115	0.0057440	-0.0003862
	117	0.0043802	-0.0007511
	118	0.0005517	-0.0019060
	119	-0.0016293	-0.0022495
1	120	-0.0037652	-0.0024859
	121	-0.0059779	-0.0025911
2	122	-0.0082525	-0.0026278
	123	0.0056797	0.0001246
	125	0.0027350	0.0000244

	126	-0.0014325	-0.0002934
1	127	-0.0058995	-0.0004245
	128	-0.0081370	-0.0004538
2	130	0.0053559	0.0005267
	132	0.0043393	0.0009975
3	133	0.0007668	0.0015360
	134	-0.0035964	0.0016850
4	135	-0.0080694	0.0017098
	137	0.0052170	0.0010881
	139	0.0040437	0.0020099
	140	0.0025765	0.0027162
6	141	-0.0013914	0.0036002
	142	-0.0058469	0.0038523
7	143	-0.0080554	0.0038663

APPENDIX 5

Straight slit with circled ends , 'LST' type .

The following presents :

- 1- Input data , pp 165 - 185 .
- 2- Output data , pp 186 - 218 .

APPENDIX B STRAIGHT SLIT WITH CIRCLED ENDS

TEST TYPE

TYPE PLANE STRESS

UNITS INCHES

UNITS POUNDS

JOINT COORDINATES

1 0.00 0.02125 C

555 C

2 0.00 0.25 C

556 C

3 0.00 0.50 C

557 C

4 0.00 1.00 C

558 C

5 0.00 1.50 C

559 C

6 0.00 2.50 C

560 C

7 0.00 2.50 C

561 C

8 0.00 4.00 C

147

148

149

150

9 0.25 0.02125

151

10 0.25 0.25

152

153

154

155

156

157

158

159

160

161

162

163

164

165

166

16 0.50 0.03125

171

17 0.50 0.50

172

18 0.50 1.00

173

19 0.50 2.00

174

20 0.50 2.50

175

21 0.50 3.00

176

22 0.50 3.50

177

23 0.50 4.00

178

179

180

24 0.75 C.C3125

167

181

25 0.75 C.25

182

183

184

185

186

187

188

189

190

191

192

193

194

195

26 1.00 C.C3125

196

27 1.00 0.50

197

28 1.00 1.50

198

29 1.00 2.50

199

30 1.00 3.50

200

31 1.00 4.00

201

202

203

32 1.25 C.C3125

204

167

33 1.25 0.25

205

206

207

208

209

210

211

212

213

214

215

216

217

218

39 1.50 0.02125

223

40 1.50 0.50

224

41 1.50 1.00

225

42 1.50 2.00

226

43 1.50 2.50

227

44 1.50 3.00

228

45 1.50 3.50

229

46 1.50 4.00

300

301

302

47 1.75 C.C3125

303

48 1.75 C.25

304

305

306

307

308

309

310

311

312

313

314

315

316

317

49 2.00 C.C3125

318

50 2.00 0.50

319

51 2.00 1.50

320

52 2.00 2.50

321

53 2.00 3.50

322

54 2.00 4.00

323

324

325

55 2.25 0.C3125

326

56 2.25 0.25

170

327

328

329

330

331

332

333

334

335

336

337

338

339

340

341

62 2.503 0.03125

346

63 2.50 0.25

347

64 2.50 0.50

348

65 2.50 1.00

370

66 2.50 2.00

349

67 2.50 2.50

350

68 2.50 3.00

351

69 2.50 3.50

352

70 2.50 4.00

171

353

354

71 2.552 0.15

355

356

357

358

72 2.640 0.224

359

73 2.625 0.375

360

361

362

363

364

365

74 2.75 0.25

366

75 2.75 0.50

367

76 2.75 0.75

368

369

371

372

373

374

375

376

377

378

379

380

381

77 2.87 C.22

382

78 2.875 C.375

383

384

385

386

387

388

389

79 2.97 0.12

397

390

80 3.00 0.00 S

81 3.00 C.25

391

82 3.00 0.50

392

83 3.00 1.00

393

84 3.00 1.50

394

85 3.00 2.50

395

86 3.00 3.50

396

87 3.00 4.00

398

399

400

401

402

403

404 S

88 3.25 0.25

405

89 3.25 0.75

406

407

408

409

410

411

412

413

414

415

420

421

422

423

95 3.50 0.00 S

424

96 3.50 0.50

425

97 3.50 1.00

426

98 3.50 2.00

427

99 3.50 2.50

428

100 3.50 3.00

429

101 3.50 3.50

430

102 3.50 4.00

431

432

433

434

435

436

437

438

439

440

441

442

443 S

103 4.00 0.50

444

105 4.00 1.50

445

106 4.00 2.50

446

107 4.00 3.50

447

108 4.00 4.00

448

449

451

452

453

454

455

456

457

458

459

460

114 4.50 0.00 S

465

115 4.50 0.50

466

117 4.50 1.00

476

118 4.50 2.00

467

119 4.50 2.50

468

120 4.50 3.00

469

121 4.50 3.50

470

122 4.50 4.00

471

472

474

475

477

478

479

480

481

482

483

484

485 S

123 5.00 0.50

486

125 5.00 1.50

1. 487

2. 126 5.00 2.50

3. 488

4. 127 5.00 3.50

5. 489

6. 128 5.00 4.00

7. 490

8. 491

9. 493

10. 494

11. 495

12. 496

13. 497

14. 498

15. 499

16. 500

17. 129 5.50 0.00 S

18. 501

19. 130 5.50 0.50

20. 502

21. 132 5.50 1.00

22. 503

23. 133 5.50 2.00

24. 504

25. 134 5.50 3.00

26. 505

27. 135 5.50 4.00

28. 506 S

29. 507

30. 508

31. 510

32. 511

512

513

514

515

516

517

518

136 6.00 0.00 S

519

137 6.00 0.50

520

139 6.00 1.00

521

140 6.00 1.50

522

141 6.00 2.50

523

142 6.00 3.50

524

143 6.00 4.00

ELEMENT INCIDENCES

1 2 1 10 1525 148 149

2 1 9 10 147 151 148

3 10 9 16 151 164 165

4 10 16 25 165 179 171

5 16 24 25 178 181 179

6 25 24 26 181 193 194

7 25 26 33 194 202 196

8 26 32 33 201 204 202

9 33 32 39 204 216 217

10 33 39 48 217 301 223

11 39 47 48 300 303 301

12 48 47 49 303 315 316

13 48 49 56 316 324 318

14 49 55 56 323 326 324
15 56 55 62 326 338 339
16 56 62 63 339 346 340
17 63 62 71 346 353 354
18 63 71 72 354 355 356
19 63 72 73 356 359 357
20 73 72 74 359 363 364
21 73 74 75 364 366 365
22 75 74 78 366 380 381
23 74 77 78 379 382 380
24 78 77 81 382 387 388
25 77 79 81 386 390 387
26 81 79 88 390 399 400
27 79 80 88 397 398 399
28 80 95 88 404 420 398
29 3 2 10 526 149 150
30 3 10 17 150 166 152
31 10 25 17 171 180 166
32 17 25 27 180 195 182
33 25 33 27 196 203 195
34 27 33 40 203 218 205
35 33 48 40 223 302 218
36 40 48 50 302 317 304
37 48 56 50 318 325 317
38 50 56 64 325 341 327
39 56 62 64 340 347 341
40 64 63 73 347 357 358
41 64 73 75 358 365 360
42 75 78 82 381 389 383
43 78 81 82 388 391 389
44 82 81 88 391 400 401
45 82 88 96 401 421 405
46 88 95 96 420 424 421

47	4	2	18	527	153	154
48	3	17	18	152	172	153
49	18	17	27	172	182	183
50	18	27	41	183	206	197
51	27	40	41	205	224	206
52	41	40	50	224	304	305
53	41	50	65	305	328	319
54	50	64	65	327	348	328
55	65	64	76	348	361	362
56	64	75	76	360	367	361
57	76	75	82	367	383	384
58	65	76	83	362	385	368
59	76	82	83	384	392	385
60	83	82	89	392	402	403
61	82	96	89	405	422	402
62	83	89	97	403	423	406
63	89	96	97	422	425	423
64	97	96	103	425	432	433
65	96	95	103	424	431	432
66	97	103	117	433	451	444
67	95	114	103	443	448	431
68	103	115	117	449	466	451
69	103	114	115	448	465	449
70	117	115	123	466	472	474
71	115	114	123	465	471	472
72	117	123	132	474	493	486
73	114	129	123	485	490	471
74	123	130	132	491	502	493
75	123	129	130	490	501	491
76	132	130	137	502	508	510
77	130	129	137	501	507	508
78	132	137	139	510	520	511
79	129	126	137	506	519	507

80 5 4 18 528 154 155

81 5 18 28 155 184 173

82 18 41 28 197 207 184

83 28 41 51 207 306 225

84 41 65 51 319 329 306

85 51 65 84 329 369 370

86 65 83 84 368 393 369

87 84 83 97 393 406 407

88 84 97 105 407 434 426

89 97 117 105 444 452 434

90 105 117 125 452 475 476

91 117 132 125 486 494 475

92 125 132 140 494 512 503

93 132 139 140 511 521 512

94 6 5 19 529 156 157

95 5 28 19 173 185 156

96 19 28 29 185 198 186

97 6 19 20 157 174 158

98 20 19 29 174 186 187

99 29 28 42 198 208 209

100 29 42 43 209 226 210

101 43 42 52 226 308 309

102 28 51 42 225 307 208

103 42 51 52 307 320 308

104 52 51 66 320 330 331

105 52 66 67 331 349 332

106 67 66 85 349 372 373

107 51 84 66 370 371 330

108 66 84 85 371 394 372

109 85 84 98 394 408 409

110 85 98 99 409 427 410

111 99 98 106 427 436 437

112 84 105 98 426 435 408

1 113 98 105 106 435 445 436

2 114 106 105 118 445 453 454

3 115 106 118 119 454 467 455

4 116 119 118 126 467 478 479

5 117 105 125 118 476 477 453

6 118 118 125 126 477 487 478

7 119 126 125 133 487 495 496

8 120 126 133 141 496 514 504

9 121 125 140 133 503 513 495

10 122 133 140 141 513 522 514

11 123 7 6 21 530 159 160

12 124 7 21 22 160 176 161

13 125 6 20 21 158 175 159

14 126 22 21 30 176 189 190

15 127 21 20 29 175 187 188

16 128 21 29 30 188 199 189

17 129 30 29 44 199 211 212

18 130 30 44 45 212 228 213

19 131 29 43 44 210 227 211

20 132 45 44 52 228 311 312

21 133 44 43 52 227 309 310

22 134 44 52 53 310 321 311

23 135 53 52 68 321 333 334

24 136 53 68 69 334 351 335

25 137 52 67 68 332 350 333

26 138 69 68 86 351 375 376

27 139 68 85 86 374 395 375

28 140 68 67 85 350 373 374

29 141 86 85 100 395 411 412

30 142 86 100 101 412 429 413

31 143 85 99 100 410 428 411

32 144 101 100 107 429 439 440

145 100 99 106 428 437 438

146 100 106 107 438 446 439

147 107 106 120 446 456 457

148 107 120 121 457 469 458

149 106 119 120 455 468 456

150 121 120 127 469 481 182

151 120 119 126 468 479 480

152 120 126 127 480 488 481

153 127 126 134 488 497 498

154 127 134 142 498 516 505

155 126 141 134 504 515 497

156 134 141 142 515 523 516

157 8 7 23 531 162 163

158 7 22 23 161 177 162

159 23 22 30 177 190 191

160 23 30 31 191 200 192

161 31 30 46 200 214 215

162 30 45 46 213 229 214

163 46 45 53 229 312 313

164 46 52 54 313 322 314

165 54 53 70 322 336 337

166 53 69 70 345 352 336

167 70 69 86 352 376 377

168 70 86 87 377 396 378

169 87 86 102 396 414 415

170 86 101 102 413 430 414

171 102 101 107 430 440 441

172 102 107 108 441 447 442

173 108 107 122 447 459 460

174 107 121 122 458 470 459

175 122 121 127 470 482 483

176 122 127 128 483 489 484

177 128 127 135 489 499 500

178 127 142 135 505 517 499

179 135 142 143 517 524 518

ELEMENT PROPERTIES

1 IC 179 TYPE 'LST' THICKNESS 0.10

CONSTANTS

E 30000. ALL

POISSON 0.3 ALL

JOINT RELEASES

1 IC 8 FORCE Y

525 TO 531 FORCE Y

80 95 114 129 136 404 443 485 506 FORCE X

\$ PLATE LENGTH LC=12, WIDTH WD=8, WELD WIDTH W=1/16, WELD LENGTH CENTER

\$ TO CENTER L=5.5, END CIRCLE DIAMETER=0.50, SAW CUT WIDTH WS=1/32,

\$ SIGMA0=8*10**4

LOADING 'CNE' 'X=0.20'

JOINT LOADS

1 FORCE Y -0.50

147 FORCE Y -1.0

9 FORCE Y -1.0

164 FORCE Y -1.0

16 FORCE Y -0.50

LOADING 'IWC' 'X=0.40'

JOINT LOADS

1 FORCE Y -0.50

147 FORCE Y -1.00

9 FORCE Y -1.00

164 FORCE Y -1.00

16 FORCE Y -1.00

178 FORCE Y -1.00

24 FORCE Y -1.00

193 FORCE Y -1.00

26 FORCE Y -0.50

LOADING 'TREF' 'X=0.60'

JOINT LOADS

FORCE Y -0.50

184

FORCE Y -1.00

9 FORCE Y -1.00

164 FORCE Y -1.00

16 FORCE Y -1.00

178 FORCE Y -1.00

24 FORCE Y -1.00

193 FORCE Y -1.00

26 FORCE Y -1.00

201 FORCE Y -1.00

32 FORCE Y -1.00

216 FORCE Y -1.00

39 FORCE Y -0.50

LOADING 'ECUR' 'X=0.80'

JOINT LOADS

1 FORCE Y -0.50

147 FORCE Y -1.00

9 FORCE Y -1.00

164 FORCE Y -1.00

16 FORCE Y -1.00

178 FORCE Y -1.00

24 FORCE Y -1.00

193 FORCE Y -1.00

26 FORCE Y -1.00

201 FORCE Y -1.00

32 FORCE Y -1.00

216 FORCE Y -1.00

39 FORCE Y -1.00

300 FORCE Y -1.00

47 FORCE Y -1.00

315 FORCE Y -1.00

49 FORCE Y -0.50

LOADING 'FIVE' 'X=1.00'

184

1 FORCE Y -0.50

147 FORCE Y -1.00

9 FORCE Y -1.00

164 FORCE Y -1.00

16 FORCE Y -1.00

178 FORCE Y -1.00

24 FORCE Y -1.00

193 FORCE Y -1.00

26 FORCE Y -1.00

201 FORCE Y -1.00

32 FORCE Y -1.00

216 FORCE Y -1.00

39 FORCE Y -1.00

300 FORCE Y -1.00

47 FORCE Y -1.00

315 FORCE Y -1.00

49 FORCE Y -1.00

323 FORCE Y -1.00

55 FORCE Y -1.00

338 FORCE Y -1.00

62 FORCE Y -0.50

DUMP TIME

TIME BEGIN

STIFFNESS ANALYSIS 5

TIME FOR CONSISTENCY CHECKS FOR 179 MEMBERS= 1.48 SECONDS

TIME TO GENERATE 179 ELEMENT STIF. MATRICES 14.78 SECONDS

TIME TO ASSEMBLE THE STIFFNESS MATRIX 101.87 SECONDS

TIME TO PROCESS 404 JOINTS 16.21 SECONDS

TIME TO SOLVE WITH 81 PARTITIONS 884.47 SECONDS

TIME TO PROCESS 404 JOINT DISPLACEMENTS 89.49 SECONDS

TIME TO PROCESS 179 ELEMENT STRESSES 62.22 SECONDS

TIME PRINT

ELAPSED TIME 1172.69 SECONDS

LIST DISPLACEMENTS STRESSES ALL

LOADING - ONE

X=0.20

RESULTANT JOINT DISPLACEMENTS - SUPPORTS

JOINT	DISPLACEMENT		
	X DISP.	Y DISP.	Z DISP.
1	0.0	-0.0048863	
525	0.0	-0.0045995	
2	0.0	-0.0043316	
526	0.0	-0.0040575	
3	0.0	-0.0038001	
527	0.0	-0.0033409	
4	0.0	-0.0030038	
528	0.0	-0.0027707	
5	0.0	-0.0026042	
529	0.0	-0.0023665	
6	0.0	-0.0022300	
530	0.0	-0.0021495	
7	0.0	-0.0020979	
531	0.0	-0.0020772	
8	0.0	-0.0020535	
80	0.0005483	0.0	
404	0.0005434	0.0	
95	0.0005171	0.0	
443	0.0004894	0.0	
114	0.0004925	0.0	
485	0.0005167	0.0	
129	0.0005501	0.0	
506	0.0005681	0.0	
136	0.0005844	0.0	

RESULTANT JOINT DISPLACEMENTS - FREE JOINTS

JOINT	DISPLACEMENT		
	X DISP.	Y DISP.	Z DISP.
147	0.0002726	-0.0046557	
148	0.0001204	-0.0044765	
149	0.0000376	-0.0042485	
150	-0.0000139	-0.0039858	
9	0.0004858	-0.0045564	
151	0.0002414	-0.0042878	
10	0.0000770	-0.0040388	
152	-0.0001031	-0.0035494	
153	-0.0001367	-0.0031854	
154	-0.0001162	-0.0029017	
155	-0.0000983	-0.0026922	
156	-0.0000622	-0.0024298	
157	-0.0000457	-0.0022716	
158	-0.0000437	-0.0022157	
159	-0.0000420	-0.0021715	
160	-0.0000470	-0.0021094	
161	-0.0000544	-0.0020865	
162	-0.0000658	-0.0020658	

163	-0.0000328	-0.0020435
164	0.0006653	-0.0040096
165	0.0003231	-0.0038234
166	-0.0000418	-0.0034529
16	0.0007738	-0.0034402
171	0.0001397	-0.0031644
17	-0.0001243	-0.0029192
172	-0.0002123	-0.0027558
18	-0.0002065	-0.0026229
173	-0.0001279	-0.0024322
19	-0.0000977	-0.0022781
174	-0.0000875	-0.0022191
20	-0.0000833	-0.0021694
175	-0.0000826	-0.0021304
21	-0.0000856	-0.0020993
176	-0.0000929	-0.0020743
22	-0.0001065	-0.0020529
177	-0.0001289	-0.0020332
23	-0.0001626	-0.0020132
178	0.0007890	-0.0027548
179	0.0004019	-0.0027411
180	0.0000058	-0.0025742
24	0.0006887	-0.0023151
181	0.0004086	-0.0022752
25	0.0001966	-0.0022297
182	-0.0001208	-0.0020575
183	-0.0001385	-0.0022541
184	-0.0001589	-0.0023183
185	-0.0001383	-0.0022278
186	-0.0001214	-0.0021344
187	-0.0001176	-0.0020965
188	-0.0001178	-0.0020650
189	-0.0001350	-0.0020175
190	-0.0001546	-0.0019991
191	-0.0001869	-0.0019818
192	-0.0002351	-0.0019628
193	0.0005777	-0.0020508
194	0.0003834	-0.0020353
195	0.0000533	-0.0019767
26	0.0004937	-0.0018933
196	0.0002303	-0.0018837
27	0.0000500	-0.0019334
197	-0.0000926	-0.0020810
28	-0.0001418	-0.0020892
198	-0.0001472	-0.0020553
29	-0.0001447	-0.0020040
199	-0.0001552	-0.0019600
30	-0.0001964	-0.0019274
200	-0.0002379	-0.0019132
31	-0.0002990	-0.0018967
201	0.0004390	-0.0018067
202	0.0003562	-0.0017994
203	0.0001687	-0.0018496
32	0.0004149	-0.0017555
204	0.0003593	-0.0017616
33	0.0002990	-0.0017785
205	0.0001380	-0.0018177
206	0.0000391	-0.0018615
207	-0.0000928	-0.0019248
208	-0.0001429	-0.0019327
209	-0.0001606	-0.0019102
210	-0.0001639	-0.0018953
211	-0.0001699	-0.0018803
212	-0.0002013	-0.0018536
213	-0.0002320	-0.0018416
214	-0.0002800	-0.0018303

215	-0.0003505	-0.0018179
216	0.0004246	-0.0017110
217	0.0003737	-0.0017169
218	0.0002374	-0.0017406
39	0.0004422	-0.0016592
223	0.0003318	-0.0016708
40	0.0001985	-0.0016977
224	0.0000890	-0.0017280
41	-0.0000002	-0.0017570
225	-0.0001067	-0.0017819
42	-0.0001541	-0.0017872
226	-0.0001676	-0.0017836
43	-0.0001768	-0.0017776
227	-0.0001868	-0.0017701
44	-0.0002018	-0.0017620
228	-0.0002247	-0.0017538
45	-0.0002593	-0.0017457
229	-0.0003121	-0.0017376
46	-0.0003899	-0.0017290
300	0.0004652	-0.0015994
301	0.0004092	-0.0016053
302	0.0002846	-0.0016205
47	0.0004895	-0.0015340
303	0.0004299	-0.0015403
48	0.0003703	-0.0015459
304	0.0002392	-0.0015621
305	0.0001242	-0.0015830
306	-0.0000421	-0.0016188
307	-0.0001266	-0.0016430
308	-0.0001708	-0.0016545
309	-0.0001844	-0.0016558
310	-0.0001974	-0.0016547
311	-0.0002415	-0.0016480
312	-0.0002778	-0.0016440
313	-0.0003333	-0.0016392
314	-0.0004137	-0.0016339
315	0.0005143	-0.0014633
316	0.0004506	-0.0014693
317	0.0003196	-0.0014811
49	0.0005385	-0.0013872
318	0.0004051	-0.0013980
50	0.0002673	-0.0014096
319	0.0000501	-0.0014413
51	-0.0000792	-0.0014834
320	-0.0001477	-0.0015144
52	-0.0001877	-0.0015340
321	-0.0002243	-0.0015410
53	-0.0002873	-0.0015402
322	-0.0003436	-0.0015388
54	-0.0004241	-0.0015379
323	0.0005610	-0.0013050
324	0.0004888	-0.0013105
325	0.0003464	-0.0013212
55	0.0005810	-0.0012170
326	0.0005057	-0.0012220
56	0.0004344	-0.0012274
327	0.0002842	-0.0012384
328	0.0001606	-0.0012530
329	-0.0000091	-0.0012999
330	-0.0001072	-0.0013563
331	-0.0001662	-0.0014009
332	-0.0001870	-0.0014161
333	-0.0002061	-0.0014267
334	-0.0002552	-0.0014373
335	-0.0002903	-0.0014393
336	-0.0003428	-0.0014414

337	-0.0004187	-0.0014445
338	0.0005946	-0.0011246
339	0.0005199	-0.0011276
340	0.0014487	-0.0011335
341	0.0003664	-0.0011391
62	0.0006012	-0.0010309
346	0.0005311	-0.0010376
63	0.0004616	-0.0010354
347	0.0003734	-0.0010390
64	0.0002924	-0.0010429
348	0.0001691	-0.0010633
65	0.0000758	-0.0010962
370	-0.0000489	-0.0011797
66	-0.0001289	-0.0012541
349	-0.0001582	-0.0012827
67	-0.0001827	-0.0013052
350	-0.0002045	-0.0013219
68	-0.0002269	-0.0013330
351	-0.0002525	-0.0013405
69	-0.0002850	-0.0013461
352	-0.0003318	-0.0013512
70	-0.0004005	-0.0013570
353	0.0005635	-0.0010142
354	0.0004967	-0.0010137
71	0.0005289	-0.0009942
355	0.0005142	-0.0009537
356	0.0004787	-0.0009768
357	0.0004208	-0.0009832
358	0.0003314	-0.0009840
72	0.0005003	-0.0009077
359	0.0004348	-0.0009150
73	0.0002739	-0.0009211
360	0.0002913	-0.0009250
361	0.0002276	-0.0009391
362	0.0001253	-0.0009801
363	0.0005003	-0.0008417
364	0.0004254	-0.0008513
365	0.0003274	-0.0008540
74	0.0004926	-0.0007672
366	0.0003683	-0.0007715
75	0.0002919	-0.0007913
367	0.0002303	-0.0008179
76	0.0001788	-0.0008482
368	0.0000962	-0.0009147
369	0.0000283	-0.0009800
371	-0.0000746	-0.0010912
372	-0.0001470	-0.0011754
373	-0.0001751	-0.0012056
374	-0.0001988	-0.0012285
375	-0.0002452	-0.0012560
376	-0.0002728	-0.0012646
377	-0.0003113	-0.0012719
378	-0.0003673	-0.0012813
379	0.0005055	-0.0006686
380	0.0004181	-0.0006720
381	0.0003261	-0.0007000
77	0.0005056	-0.0005532
382	0.0004260	-0.0005682
78	0.0003672	-0.0005942
383	0.0002970	-0.0006454
384	0.0002404	-0.0006932
385	0.0001494	-0.0007842
386	0.0005176	-0.0004208
387	0.0004723	-0.0004296
388	0.0004147	-0.0004733
389	0.0003368	-0.0005446

79	0.0005175	-0.0002523
397	0.0005273	-0.0001325
390	0.0005005	-0.0003042
81	0.0004624	-0.0003454
391	0.0003829	-0.0004351
82	0.0003137	-0.0005120
392	0.0002109	-0.0006385
83	0.0001292	-0.0007411
393	0.0000595	-0.0008296
84	0.0000009	-0.0009070
394	-0.0000935	-0.0010344
85	-0.0001645	-0.0011220
395	-0.0002140	-0.0011730
86	-0.0002552	-0.0011994
396	-0.0002831	-0.0012086
87	-0.0003233	-0.0012219
398	0.0005334	-0.0001185
399	0.0005104	-0.0001843
400	0.0004716	-0.0002295
401	0.0004027	-0.0003247
402	0.0002828	-0.0004853
403	0.0001893	-0.0006111
88	0.0004785	-0.0001706
405	0.0003618	-0.0003344
89	0.0002584	-0.0004785
406	0.0001718	-0.0006020
407	0.0000994	-0.0007065
408	-0.0000186	-0.0008804
409	-0.0001120	-0.0010082
410	-0.0001500	-0.0010564
411	-0.0001808	-0.0010939
412	-0.0002220	-0.0011411
413	-0.0002351	-0.0011559
414	-0.0002486	-0.0011680
415	-0.0002676	-0.0011831
420	0.0005147	-0.0006661
421	0.0004322	-0.0002101
422	0.0003298	-0.0003541
423	0.0002375	-0.0004861
424	0.0001473	-0.0006199
96	0.0003932	-0.0002520
425	0.0003038	-0.0003797
97	0.0002192	-0.0005019
426	0.0000773	-0.0007150
98	-0.0000330	-0.0008833
427	-0.0000873	-0.0009527
99	-0.0001314	-0.0010116
428	-0.0001676	-0.0010587
100	-0.0001921	-0.0010931
429	-0.0002059	-0.0011188
101	-0.0002117	-0.0011394
430	-0.0002118	-0.0011558
102	-0.0002055	-0.0011688
431	0.0004748	-0.0001014
432	0.0004139	-0.0002113
433	0.0003380	-0.0003270
434	0.0001882	-0.0005484
435	0.0000559	-0.0007473
436	-0.0000584	-0.0009172
437	-0.0001071	-0.0009880
438	-0.0001512	-0.0010475
439	-0.0001884	-0.0011263
440	-0.0001853	-0.0011533
441	-0.0001742	-0.0011758
442	-0.0001454	-0.0011940
103	0.0004286	-0.0001886

444	0.0002981	-0.0003975
105	0.0001622	-0.0006079
445	0.0000367	-0.0008061
106	-0.0000766	-0.0009849
446	-0.0001648	-0.0011232
107	-0.0001577	-0.0012030
447	-0.0001375	-0.0012356
108	-0.0000948	-0.0012542
448	0.0004758	-0.0000864
449	0.0004408	-0.0001767
451	0.0003905	-0.0002708
452	0.0002699	-0.0004726
453	0.0001441	-0.0006811
454	0.0000216	-0.0008884
455	-0.0000384	-0.0009925
456	-0.0001032	-0.0010989
457	-0.0001597	-0.0012565
458	-0.0001055	-0.0013101
459	-0.0001150	-0.0013322
460	-0.0000899	-0.0013311
465	0.0004837	-0.0000824
115	0.0004556	-0.0001682
466	0.0004138	-0.0002581
117	0.0003638	-0.0003527
476	0.0002501	-0.0005492
118	0.0001321	-0.0007617
467	0.0000744	-0.0008771
119	0.0000176	-0.0009996
468	-0.0000439	-0.0011371
120	-0.0001257	-0.0012948
469	-0.0001411	-0.0014199
121	-0.0000521	-0.0014876
470	-0.0001175	-0.0014310
122	-0.0001314	-0.0014010
471	0.0004953	-0.0000797
472	0.0004724	-0.0001609
474	0.0004370	-0.0002459
475	0.0003435	-0.0004266
477	0.0002396	-0.0006251
478	0.0001358	-0.0008526
479	0.0000833	-0.0009840
480	0.0000369	-0.0011347
481	-0.0000329	-0.0016156
482	-0.0000916	-0.0014204
483	-0.0001488	-0.0014094
484	-0.0002075	-0.0013875
123	0.0004904	-0.0001532
486	0.0004209	-0.0003163
125	0.0003315	-0.0004952
487	0.0002391	-0.0006934
126	0.0001541	-0.0009311
488	0.0000869	-0.0011944
127	-0.0000937	-0.0013956
489	-0.0001915	-0.0013398
128	-0.0003010	-0.0012999
490	0.0005268	-0.0000721
491	0.0005092	-0.0001450
493	0.0004818	-0.0002197
494	0.0004077	-0.0003781
495	0.0003237	-0.0005484
496	0.0002463	-0.0007351
497	0.0001728	-0.0009287
498	0.0000288	-0.0010875
499	-0.0002257	-0.0011480
500	-0.0003673	-0.0011393
501	0.0005447	-0.0000670

130	0.0005283	-0.0001350
502	0.0005030	-0.0002045
132	0.0004708	-0.0002763
503	0.0003950	-0.0004263
133	0.0003192	-0.0005828
504	0.0002428	-0.0007379
134	0.0001278	-0.0008601
505	-0.0000886	-0.0009269
135	-0.0003878	-0.0009439
507	0.0005627	-0.0000607
508	0.0005471	-0.0001224
510	0.0005230	-0.0001861
511	0.0004921	-0.0002521
512	0.0004564	-0.0003205
513	0.0003815	-0.0004594
514	0.0003071	-0.0005945
515	0.0002094	-0.0006966
516	0.0000354	-0.0007534
517	-0.0002284	-0.0007746
518	-0.0003832	-0.0007771
519	0.0005796	-0.0000523
137	0.0005649	-0.0001060
520	0.0005414	-0.0001629
139	0.0005116	-0.0002229
521	0.0004768	-0.0002865
140	0.0004387	-0.0003525
522	0.0003661	-0.0004821
141	0.0002783	-0.0005794
523	0.0001379	-0.0006288
142	-0.0000845	-0.0006395
524	-0.0002293	-0.0006299
143	-0.0003800	-0.0006251

LOADING - TWO

X=0.40

RESULTANT JOINT DISPLACEMENTS - SUPPORTS

JOINT

/-----DISPLACEMENT-----/

X DISP.

Y DISP.

Z DISP.

1	0.0	-0.0071817	
525	0.0	-0.0069030	
2	0.0	-0.0066452	
526	0.0	-0.0063798	
3	0.0	-0.0061216	
527	0.0	-0.0056140	
4	0.0	-0.0052150	
528	0.0	-0.0049129	
5	0.0	-0.0046869	
529	0.0	-0.0043511	
6	0.0	-0.0041440	
530	0.0	-0.0040151	
7	0.0	-0.0039297	
531	0.0	-0.0038946	
8	0.0	-0.0038540	
80	0.0010467	0.0	
404	0.0010371	0.0	
95	0.0009858	0.0	
443	0.0009332	0.0	
114	0.0009418	0.0	
485	0.0009925	0.0	
129	0.0010617	0.0	

500
1260.0010991
0.00113350.0
0.0

193

RESULTANT JOINT DISPLACEMENTS - FREE JOINTS

JOINT /-----DISPLACEMENT-----/

X DISP. Y DISP. Z DISP.

147	0.0002693	-0.0069679	
148	0.0001512	-0.0067942	
149	0.0000853	-0.0065766	
150	0.0000328	-0.0063208	
9	0.0004732	-0.0069277	
151	0.0003075	-0.0066574	
10	0.0001795	-0.0064128	
152	-0.0000363	-0.0059019	
153	-0.0001257	-0.0054572	
154	-0.0001274	-0.0050936	
155	-0.0001182	-0.0048128	
156	-0.0000831	-0.0044470	
157	-0.0000690	-0.0042084	
158	-0.0000684	-0.0041209	
159	-0.0000681	-0.0040504	
160	-0.0000795	-0.0039489	
161	-0.0000929	-0.0039105	
162	-0.0001130	-0.0038753	
163	-0.0001422	-0.0038365	
164	0.0006346	-0.0065326	
165	0.0004410	-0.0063439	
166	0.0000933	-0.0058810	
16	0.0007852	-0.0063064	
171	0.0003239	-0.0057454	
17	-0.0000538	-0.0052635	
172	-0.0002154	-0.0049640	
18	-0.0002402	-0.0047427	
173	-0.0001632	-0.0044621	
19	-0.0001410	-0.0042223	
174	-0.0001336	-0.0041268	
20	-0.0001319	-0.0040473	
175	-0.0001344	-0.0039837	
21	-0.0001424	-0.0039321	
176	-0.0001573	-0.0038899	
22	-0.0001822	-0.0038536	
177	-0.0002214	-0.0038199	
23	-0.0002795	-0.0037855	
178	0.0008819	-0.0058216	
179	0.0005592	-0.0056048	
180	0.0001399	-0.0049865	
24	0.0008797	-0.0055635	
181	0.0005579	-0.0052166	
25	0.0003038	-0.0048720	
182	-0.0001416	-0.0041048	
183	-0.0001324	-0.0043390	
184	-0.0001955	-0.0043359	
185	-0.0001948	-0.0041609	
186	-0.0001891	-0.0039972	
187	-0.0001890	-0.0039314	
188	-0.0001937	-0.0038765	
189	-0.0002295	-0.0037940	
190	-0.0002648	-0.0037622	
191	-0.0003216	-0.0037322	
192	-0.0004051	-0.0036992	
193	0.0008645	-0.0050211	

143

194	0.0005245	-0.0048016
195	0.0005379	-0.0042823
26	0.0008579	-0.0045716
196	0.0002646	-0.0042754
27	0.0000422	-0.0040912
197	-0.0001087	-0.0040652
28	-0.0002015	-0.0039894
198	-0.0002282	-0.0038850
29	-0.0002370	-0.0037798
199	-0.0002623	-0.0036980
30	-0.0003373	-0.0036394
200	-0.0004103	-0.0036143
31	-0.0005164	-0.0035855
201	0.0008436	-0.0040593
202	0.0005382	-0.0040492
203	0.0001770	-0.0040148
32	0.0008037	-0.0037785
204	0.0005966	-0.0037851
33	0.0004183	-0.0038085
205	0.0001581	-0.0038399
206	0.0000326	-0.0038245
207	-0.0001416	-0.0037694
208	-0.0002287	-0.0037087
209	-0.0002653	-0.0036343
210	-0.0002748	-0.0035986
211	-0.0002874	-0.0035661
212	-0.0003454	-0.0035131
213	-0.0003996	-0.0034909
214	-0.0004839	-0.0034707
215	-0.0006069	-0.0034489
216	0.0008168	-0.0035917
217	0.0006510	-0.0036061
218	0.0003430	-0.0036492
39	0.0008470	-0.0034275
223	0.0005576	-0.0034576
40	0.0002853	-0.0034977
224	0.0001048	-0.0035209
41	-0.0000273	-0.0035232
225	-0.0001862	-0.0034815
42	-0.0002640	-0.0034412
226	-0.0002868	-0.0034188
43	-0.0003032	-0.0033968
227	-0.0003209	-0.0033759
44	-0.0003474	-0.0033567
228	-0.0003874	-0.0033393
45	-0.0004477	-0.0033236
229	-0.0005402	-0.0033087
46	-0.0006767	-0.0032936
300	0.0008891	-0.0032709
301	0.0007493	-0.0032828
302	0.0004666	-0.0033169
47	0.0009342	-0.0031140
303	0.0007960	-0.0031270
48	0.0006615	-0.0031407
304	0.0003844	-0.0031724
305	0.0001731	-0.0031972
306	-0.0000996	-0.0032124
307	-0.0002320	-0.0032037
308	-0.0003017	-0.0031909
309	-0.0003230	-0.0031824
310	-0.0003440	-0.0031729
311	-0.0004179	-0.0031530
312	-0.0004805	-0.0031443
313	-0.0005774	-0.0031352
314	-0.0007192	-0.0031258
315	0.0009827	-0.0029539

316	0.0008411	-0.0029663
317	0.0005576	-0.0029916
49	0.0010295	-0.0027873
318	0.0007431	-0.0028094
50	0.0004579	-0.0028348
319	0.0000509	-0.0028300
51	-0.0001648	-0.0029214
320	-0.0002737	-0.0029482
52	-0.0003348	-0.0029635
321	-0.0003915	-0.0029651
53	-0.0004970	-0.0029596
322	-0.0005951	-0.0029569
54	-0.0007375	-0.0029553
323	0.0010730	-0.0026124
324	0.0009211	-0.0026231
325	0.0006243	-0.0026463
55	0.0011115	-0.0024292
326	0.0009556	-0.0024390
56	0.0008086	-0.0024505
327	0.0005027	-0.0024734
328	0.0002601	-0.0025007
329	-0.0000508	-0.0025776
330	-0.0002140	-0.0026615
331	-0.0003063	-0.0027266
332	-0.0003377	-0.0027480
333	-0.0003661	-0.0027625
334	-0.0004431	-0.0027760
335	-0.0005014	-0.0027787
336	-0.0005921	-0.0027824
337	-0.0007267	-0.0027884
338	0.0011377	-0.0022394
339	0.0009847	-0.0022453
340	0.0008391	-0.0022575
341	0.0006721	-0.0022690
62	0.0011502	-0.0020488
346	0.0010074	-0.0020521
63	0.0008666	-0.0020582
347	0.0006890	-0.0020658
64	0.0005269	-0.0020742
348	0.0002835	-0.0021145
65	0.0001054	-0.0021770
370	-0.0001168	-0.0023288
66	-0.0002487	-0.0024569
349	-0.0002947	-0.0025052
67	-0.0003323	-0.0025427
350	-0.0003650	-0.0025703
68	-0.0003986	-0.0025885
351	-0.0004379	-0.0026008
69	-0.0004904	-0.0026106
352	-0.0005700	-0.0026201
70	-0.0006916	-0.0026314
353	0.0010733	-0.0020148
354	0.0009376	-0.0020141
71	0.0010029	-0.0019747
355	0.0009730	-0.0018933
356	0.0009015	-0.0019398
357	0.0007853	-0.0019530
358	0.0006063	-0.0019553
72	0.0009452	-0.0018015
359	0.0008144	-0.0018163
73	0.0006926	-0.0018289
360	0.0005278	-0.0018370
361	0.0004014	-0.0018650
362	0.0002020	-0.0019455
363	0.0009459	-0.0016697
364	0.0007964	-0.0016892

365	0.0006010	-0.0016949
74	0.0009314	-0.0015214
366	0.0006837	-0.0015303
75	0.0005314	-0.0015698
367	0.0004094	-0.0016226
76	0.0003084	-0.0016824
368	0.0001498	-0.0018129
369	0.0000244	-0.0019390
371	-0.0001563	-0.0021491
372	-0.0002754	-0.0023026
373	-0.0003194	-0.0023571
374	-0.0003550	-0.0023983
375	-0.0004237	-0.0024475
376	-0.0004663	-0.0024636
377	-0.0005300	-0.0024775
378	-0.0006276	-0.0024956
379	0.0009584	-0.0013252
380	0.0007840	-0.0013322
381	0.0006006	-0.0013879
77	0.0009597	-0.0010960
382	0.0008006	-0.0011259
78	0.0006834	-0.0011775
383	0.0005437	-0.0012791
384	0.0004316	-0.0013739
385	0.0002544	-0.0015538
386	0.0009845	-0.0008334
387	0.0008940	-0.0008507
388	0.0007790	-0.0009374
389	0.0006237	-0.0010787
79	0.0009850	-0.0004995
397	0.0010049	-0.0002623
390	0.0009506	-0.0006021
81	0.0008747	-0.0006837
391	0.0007161	-0.0008613
82	0.0005787	-0.0010137
392	0.0003764	-0.0012645
83	0.0002190	-0.0014670
393	0.0000882	-0.0016405
84	-0.0000186	-0.0017909
394	-0.0001829	-0.0020357
85	-0.0002996	-0.0022012
395	-0.0003738	-0.0022966
86	-0.0004314	-0.0023466
396	-0.0004745	-0.0023646
87	-0.0005424	-0.0023904
398	0.0010167	-0.0002343
399	0.0009710	-0.0003645
400	0.0008938	-0.0004538
401	0.0007567	-0.0006423
402	0.0005196	-0.0009604
403	0.0003372	-0.0012097
88	0.0009080	-0.0003371
405	0.0006770	-0.0006614
89	0.0004738	-0.0009470
406	0.0003065	-0.0011914
407	0.0001697	-0.0013975
408	-0.0000456	-0.0017382
409	-0.0002081	-0.0019861
410	-0.0002713	-0.0020792
411	-0.0003202	-0.0021512
412	-0.0003775	-0.0022423
413	-0.0003916	-0.0022711
414	-0.0004066	-0.0022948
415	-0.0004335	-0.0023245
420	0.0009805	-0.0001306
421	0.0008172	-0.0004154

422	0.0006154	-0.0007006
423	0.0004356	-0.0009622
424	0.0009086	-0.0002370
96	0.0007413	-0.0004987
425	0.0005666	-0.0007518
97	0.0004032	-0.0009938
426	0.0001360	-0.0014152
98	-0.0000725	-0.0017461
427	-0.0001597	-0.0018820
99	-0.0002342	-0.0019971
428	-0.0002936	-0.0020891
100	-0.0003299	-0.0021565
429	-0.0003450	-0.0022070
101	-0.0003447	-0.0022477
430	-0.0003340	-0.0022801
102	-0.0003114	-0.0023059
431	0.0009035	-0.0002010
432	0.0007841	-0.0004189
433	0.0006364	-0.0006486
434	0.0003499	-0.0010878
435	0.0001043	-0.0014826
436	-0.0001008	-0.0018170
437	-0.0001856	-0.0019565
438	-0.0002604	-0.0020736
439	-0.0003094	-0.0022297
440	-0.0002915	-0.0022846
441	-0.0002589	-0.0023284
442	-0.0001927	-0.0023646
103	0.0008149	-0.0003750
444	0.0005636	-0.0007905
105	0.0003075	-0.0012088
445	0.0000777	-0.0016019
106	-0.0001243	-0.0019560
446	-0.0002734	-0.0022300
107	-0.0002351	-0.0023896
447	-0.0001853	-0.0024551
108	-0.0000921	-0.0024923
448	0.0009080	-0.0001724
449	-0.0008406	-0.0003526
451	0.0007440	-0.0005404
452	0.0005153	-0.0009429
453	0.0002818	-0.0013581
454	0.0000596	-0.0017703
455	-0.0000475	-0.0019769
456	-0.0001632	-0.0021880
457	-0.0002487	-0.0025012
458	-0.0001284	-0.0026092
459	-0.0001391	-0.0026542
460	-0.0000817	-0.0026526
465	0.0009250	-0.0001651
115	0.0008713	-0.0003370
466	0.0007916	-0.0005172
117	0.0006969	-0.0007066
476	0.0004847	-0.0010993
118	0.0002690	-0.0015235
467	0.0001654	-0.0017534
119	0.0000645	-0.0019971
468	-0.0000447	-0.0022701
120	-0.0001930	-0.0025827
469	-0.0002088	-0.0028314
121	-0.0000170	-0.0029686
470	-0.0001422	-0.0028574
122	-0.0001634	-0.0027983
471	0.0009494	-0.0001606
472	0.0009059	-0.0003240
474	0.0008390	-0.0004951

475	C.0006640	-0.0008581
477	0.0004738	-0.0012559
478	0.0002883	-0.0017105
479	C.0001958	-C.0019726
480	0.0001163	-0.0022728
481	0.0000078	-0.0032294
482	-C.0000953	-0.0028431
483	-0.0002032	-0.0028218
484	-C.0003134	-0.0027785
123	0.0009429	-0.0003104
486	0.0008131	-0.0006401
125	C.0006488	-0.0010007
487	0.0004836	-0.0013988
126	0.0003374	-0.0018748
488	C.0002302	-C.0024007
127	-0.0000979	-0.0028019
489	-C.0002875	-0.0026907
128	-0.0004986	-0.0026113
490	0.0010146	-0.0001471
491	C.0009817	-C.0002958
493	0.0009305	-C.0004480
494	C.0007941	-0.0007698
495	C.0006432	-0.0011144
496	0.0005099	-0.0014904
497	C.0003882	-0.0018793
498	0.0001292	-0.0021975
499	-0.0003558	-0.0023165
500	-C.0006294	-0.0022994
501	0.0010515	-0.0001379
130	0.0010211	-0.0002778
502	C.0009741	-C.0004207
132	0.0009148	-0.0005678
503	0.0007776	-0.0008743
133	0.0006451	-0.0011925
504	0.0005156	-0.0015063
134	0.0003121	-0.0017531
505	-0.0000934	-0.0018865
135	-0.0006693	-0.0019201
507	C.0010890	-C.0001265
508	0.0010600	-0.0002550
510	0.0010156	-0.0003874
511	0.0009587	-0.0005241
512	0.0008938	-0.0006654
513	0.0007605	-C.0009510
514	0.0006328	-0.0012275
515	0.0004623	-0.0014359
516	C.0001410	-0.0015511
517	-0.0003618	-0.0015935
518	-0.0006596	-0.0015984
519	0.0011245	-0.0001112
137	0.0010973	-0.0002250
520	0.0010540	-0.0003450
139	C.0009994	-0.0004710
521	0.0009361	-0.0006040
140	0.0008673	-0.0007412
522	C.0007408	-0.0010095
141	0.0005879	-0.0012110
523	0.0003329	-0.0013136
142	-0.0000862	-C.0013355
524	-0.0003635	-0.0013161
143	-0.0006530	-0.0013064

JOINT	/-----DISPLACEMENT-----/		
	X DISP.	Y DISP.	Z DISP.
1	0.0	-0.0089545	
525	0.0	-0.0086745	
2	0.0	-0.0084189	
526	0.0	-0.0081601	
3	0.0	-0.0079120	
527	0.0	-0.0074285	
4	0.0	-0.0070549	
528	0.0	-0.0067779	
5	0.0	-0.0065726	
529	0.0	-0.0062596	
6	0.0	-0.0060451	
530	0.0	-0.0058994	
7	0.0	-0.0057949	
531	0.0	-0.0057489	
8	0.0	-0.0056950	
80	0.0016510	0.0	
404	0.0016338	0.0	
95	0.0015504	0.0	
443	0.0014611	0.0	
114	0.0014654	0.0	
485	0.0015343	0.0	
129	0.0016316	0.0	
506	0.0016846	0.0	
136	0.0017331	0.0	

RESULTANT JOINT DISPLACEMENTS - FREE JOINTS

JOINT	/-----DISPLACEMENT-----/		
	X DISP.	Y DISP.	Z DISP.
147	0.0002695	-0.0087360	
148	0.0001499	-0.0085631	
149	0.0000881	-0.0083490	
150	0.0000407	-0.0081008	
9	0.0004698	-0.0086862	
151	0.0003052	-0.0084175	
10	0.0001854	-0.0081818	
152	-0.0000156	-0.0076901	
153	-0.0000975	-0.0072725	
154	-0.0000964	-0.0069371	
155	-0.0000900	-0.0066811	
156	-0.0000643	-0.0063558	
157	-0.0000691	-0.0061131	
158	-0.0000744	-0.0060183	
159	-0.0000800	-0.0059391	
160	-0.0001032	-0.0058189	
161	-0.0001233	-0.0057704	
162	-0.0001515	-0.0057243	
163	-0.0001902	-0.0056728	
164	0.00006065	-0.0082852	
165	0.0004316	-0.0080896	
166	0.0001242	-0.0076529	
16	0.0007128	-0.0080744	
171	0.0003506	-0.0075052	
17	-0.0000063	-0.0070401	
172	-0.0001538	-0.0067845	

18	-0.0001754	-0.0065997
173	-0.0001104	-0.0063808
19	-0.0001271	-0.0061301
174	-0.0001357	-0.0060248
20	-0.0001460	-0.0059349
175	-0.0001591	-0.0058595
21	-0.0001781	-0.0057971
176	-0.0002050	-0.0057445
22	-0.0002429	-0.0056977
177	-0.0002977	-0.0056529
23	-0.0003749	-0.0056062
178	0.0007434	-0.0076540
179	0.0005207	-0.0074253
180	0.0002157	-0.0067631
24	0.0006527	-0.0075440
181	0.0004998	-0.0071636
25	0.0003479	-0.0067784
182	-0.0000917	-0.0058665
183	0.0000115	-0.0062658
184	-0.0000981	-0.0062986
185	-0.0001580	-0.0060850
186	-0.0001978	-0.0058823
187	-0.0002138	-0.0057996
188	-0.0002331	-0.0057295
189	-0.0003009	-0.0056222
190	-0.0003546	-0.0055797
191	-0.0004344	-0.0055390
192	-0.0005463	-0.0054937
193	0.0005579	-0.0073010
194	0.0004776	-0.0070705
195	0.0001428	-0.0063797
26	0.0005812	-0.0073775
196	0.0003484	-0.0068006
27	0.0001992	-0.0063817
197	0.0000335	-0.0061423
28	-0.0001429	-0.0059582
198	-0.0002273	-0.0057741
29	-0.0002764	-0.0056169
199	-0.0003365	-0.0055011
30	-0.0004544	-0.0054190
200	-0.0005575	-0.0053839
31	-0.0007010	-0.0053433
201	0.0006866	-0.0072509
202	0.0005539	-0.0070521
203	0.0003126	-0.0066546
32	0.0008375	-0.0072985
204	0.0006696	-0.0070403
33	0.0005120	-0.0068194
205	0.0002657	-0.0064149
206	0.0001528	-0.0061545
207	-0.0000685	-0.0058088
208	-0.0002219	-0.0056096
209	-0.0003046	-0.0054548
210	-0.0003323	-0.0053912
211	-0.0003615	-0.0053372
212	-0.0004612	-0.0052545
213	-0.0005425	-0.0052215
214	-0.0006621	-0.0051919
215	-0.0008307	-0.0051601
216	0.0010674	-0.0069030
217	0.0007937	-0.0067398
218	0.0004161	-0.0064053
39	0.0012773	-0.0064471
223	0.0006732	-0.0062231
40	0.0003567	-0.0060141
224	0.0001590	-0.0058288

41	0.0000109	-0.0056693
225	-0.0001846	-0.0053931
42	-0.0003067	-0.0052417
226	-0.0003478	-0.0051806
43	-0.0003803	-0.0051290
227	-0.0004142	-0.0050861
44	-0.0004597	-0.0050503
228	-0.0005230	-0.0050204
45	-0.0006127	-0.0049948
229	-0.0007448	-0.0049715
46	-0.0009346	-0.0049486
300	0.0014384	-0.0058138
301	0.0010428	-0.0058376
302	0.0005612	-0.0057651
47	0.0015166	-0.0053513
303	0.0011747	-0.0053666
48	0.0008989	-0.0053794
304	0.0004674	-0.0053765
305	0.0002046	-0.0052904
306	-0.0001214	-0.0051159
307	-0.0002835	-0.0049638
308	-0.0003845	-0.0048728
309	-0.0004190	-0.0048382
310	-0.0004549	-0.0048089
311	-0.0005703	-0.0047633
312	-0.0006630	-0.0047467
313	-0.0008028	-0.0047313
314	-0.0010032	-0.0047155
315	0.0015867	-0.0049719
316	0.0012759	-0.0049948
317	0.0007495	-0.0050325
49	0.0016556	-0.0046238
318	0.0010964	-0.0046670
50	0.0006053	-0.0047043
319	0.0000405	-0.0046699
51	-0.0002247	-0.0046077
320	-0.0003621	-0.0045578
52	-0.0004474	-0.0045287
321	-0.0005334	-0.0045050
53	-0.0006914	-0.0044856
322	-0.0008342	-0.0044791
54	-0.0010392	-0.0044737
323	0.0017205	-0.0042890
324	0.0014358	-0.0043062
325	0.0009027	-0.0043514
55	0.0017775	-0.0039551
326	0.0014978	-0.0039715
56	0.0012369	-0.0039932
327	0.0007151	-0.0040310
328	0.0003281	-0.0040610
329	-0.0000984	-0.0041125
330	-0.0003025	-0.0041603
331	-0.0004180	-0.0042014
332	-0.0004610	-0.0042140
333	-0.0005011	-0.0042210
334	-0.0006150	-0.0042241
335	-0.0007026	-0.0042238
336	-0.0008368	-0.0042263
337	-0.0010344	-0.0042321
338	0.0018174	-0.0036199
339	0.0015489	-0.0036297
340	0.0012952	-0.0036507
341	0.0010102	-0.0036705
62	0.0018348	-0.0032903
346	0.0015874	-0.0032961
63	0.0013459	-0.0033066

347	0.0013430	-0.0033201
64	0.0007811	-0.0033347
348	0.0003919	-0.0033932
65	0.0001227	-0.0034733
370	-0.0001834	-0.0036670
66	-0.0003511	-0.0038112
349	-0.0004025	-0.0038636
67	-0.0004594	-0.0039039
350	-0.0005048	-0.0039329
68	-0.0005531	-0.0039514
351	-0.0006114	-0.0039638
69	-0.0006911	-0.0039743
352	-0.0008117	-0.0039854
70	-0.0009947	-0.0039995
353	0.0017010	-0.0032322
354	0.0014671	-0.0032315
71	0.0015789	-0.0031644
355	0.0015264	-0.0030283
356	0.0014062	-0.0031064
357	0.0012121	-0.0031292
358	0.0009163	-0.0031342
72	0.0014793	-0.0028763
359	0.0012634	-0.0029012
73	0.0010625	-0.0029231
360	0.0007924	-0.0029364
361	0.0005878	-0.0029800
362	0.0002737	-0.0030993
363	0.0014811	-0.0026598
364	0.0012363	-0.0026922
365	0.0009164	-0.0027020
74	0.0014590	-0.0024182
366	0.0010554	-0.0024332
75	0.0008065	-0.0024959
367	0.0006087	-0.0025788
76	0.0004474	-0.0026713
368	0.0002029	-0.0028686
369	0.0000202	-0.0030523
371	-0.0002294	-0.0033461
372	-0.0003855	-0.0035457
373	-0.0004441	-0.0036150
374	-0.0004927	-0.0036671
375	-0.0005936	-0.0037290
376	-0.0006599	-0.0037496
377	-0.0007595	-0.0037679
378	-0.0009119	-0.0037918
379	0.0015048	-0.0021010
380	0.0012219	-0.0021123
381	0.0009229	-0.0022012
77	0.0015087	-0.0017334
382	0.0012514	-0.0017807
78	0.0010607	-0.0018623
383	0.0009327	-0.0020229
384	0.0006511	-0.0021716
385	0.0003698	-0.0024505
386	0.0015504	-0.0013154
387	0.0014043	-0.0013419
388	0.0012177	-0.0014783
389	0.0009651	-0.0017011
79	0.0015525	-0.0007868
397	0.0015848	-0.0004130
390	0.0014963	-0.0009477
81	0.0013734	-0.0010752
391	0.0011165	-0.0013542
82	0.0008936	-0.0015935
392	0.0005680	-0.0019855
83	0.0003222	-0.0022976

393	0.0001260	-0.0025598
394	-0.0000295	-0.0027819
394	-0.0002575	-0.0031347
395	-0.0004153	-0.0033646
395	-0.0005197	-0.0034948
396	-0.0006113	-0.0035634
396	-0.0006836	-0.0035883
397	-0.0007956	-0.0036240
398	0.0016017	-0.0003658
399	0.0015283	-0.0005699
400	0.0014044	-0.0007086
401	0.0011831	-0.0010031
402	0.0008010	-0.0014997
403	0.0005112	-0.0018863
404	0.0014269	-0.0005219
405	0.0010555	-0.0010252
406	0.0007307	-0.0014681
406	0.0004682	-0.0018448
407	0.0002595	-0.0021581
408	-0.0002557	-0.0026671
409	-0.0002845	-0.0030268
410	-0.0003715	-0.0031598
411	-0.0004400	-0.0032621
412	-0.0005263	-0.0033917
413	-0.0005537	-0.0034330
414	-0.0005875	-0.0034671
415	-0.0006441	-0.0035093
420	0.0015427	-0.0002000
421	0.0012811	-0.0006381
422	0.0009582	-0.0010781
423	0.0006736	-0.0014810
424	0.0014270	-0.0003607
425	0.0011597	-0.0007615
425	0.0008822	-0.0011492
427	0.0006261	-0.0015194
426	0.0002195	-0.0021568
428	-0.0000840	-0.0026463
427	-0.0002084	-0.0028448
429	-0.0003133	-0.0030117
428	-0.0003970	-0.0031444
100	-0.0004500	-0.0032419
429	-0.0004759	-0.0033154
101	-0.0004836	-0.0033748
430	-0.0004819	-0.0034223
102	-0.0004695	-0.0034599
431	0.0014171	-0.0003016
432	0.0012273	-0.0006306
433	0.0009939	-0.0009788
434	0.0005492	-0.0016419
435	0.0001811	-0.0022312
436	-0.0001166	-0.0027214
437	-0.0002375	-0.0029239
438	-0.0003429	-0.0030932
439	-0.0004189	-0.0033205
440	-0.0004017	-0.0034014
441	-0.0003700	-0.0034663
442	-0.0002963	-0.0035197
103	0.0012740	-0.0005577
444	0.0008805	-0.0011799
105	0.0004887	-0.0018038
445	0.0001480	-0.0023823
106	-0.0001437	-0.0028957
446	-0.0003550	-0.0032901
107	-0.0003123	-0.0035249
447	-0.0002573	-0.0036215
108	-0.0001460	-0.0036774

448	0.0014171	-0.0002537
449	0.0013110	-0.0005198
451	0.0011596	-0.0007978
452	0.0008057	-0.0013945
453	0.0004527	-0.0020059
454	0.0001259	-0.0025044
455	-0.0000280	-0.0029013
456	-0.0001914	-0.0032025
457	-0.0003122	-0.0036511
458	-0.0001463	-0.0038108
459	-0.0001813	-0.0038803
460	-0.0001216	-0.0038814
465	0.0014391	-0.0002413
115	0.0013549	-0.0004933
466	0.0012302	-0.0007580
117	0.0010833	-0.0010367
476	0.0007576	-0.0016130
118	0.0004341	-0.0022303
467	0.0002818	-0.0025616
119	0.0001359	-0.0029104
468	-0.0000189	-0.0032979
120	-0.0002245	-0.0037379
469	-0.0002419	-0.0040904
121	0.0000337	-0.0042962
470	-0.0001738	-0.0041458
122	-0.0002269	-0.0040654
471	0.0014722	-0.0002336
472	0.0014040	-0.0004717
474	0.0012995	-0.0007216
475	0.0010284	-0.0012517
477	0.0007378	-0.0018302
478	0.0004610	-0.0024862
479	0.0003263	-0.0028613
480	0.0002124	-0.0032886
481	0.0000718	-0.0046424
482	-0.0000736	-0.0041052
483	-0.0002516	-0.0040785
484	-0.0004288	-0.0040194
123	0.0014566	-0.0004497
486	0.0012540	-0.0009287
125	0.0009998	-0.0014526
487	0.0007482	-0.0020283
126	0.0005310	-0.0027115
488	0.0003795	-0.0034631
127	-0.0000674	-0.0040349
489	-0.0003655	-0.0038767
128	-0.0006838	-0.0037654
490	0.0015632	-0.0002121
491	0.0015118	-0.0004268
493	0.0014316	-0.0006466
494	0.0012189	-0.0011127
495	0.0009855	-0.0016115
496	0.0007827	-0.0021538
497	0.0006045	-0.0027128
498	0.0002418	-0.0031694
499	-0.0004607	-0.0033325
500	-0.0008625	-0.0033094
501	0.0016155	-0.0001978
130	0.0015679	-0.0003987
502	0.0014942	-0.0006042
132	0.0014014	-0.0008163
503	0.0011875	-0.0012590
133	0.0009829	-0.0017194
504	0.0007893	-0.0021725
134	0.0004982	-0.0025286
505	-0.0000800	-0.0027170

135	-0.0009148	-0.0027640
507	0.0016687	-0.0001800
508	0.0016234	-0.0003632
510	0.0015537	-0.0005525
511	0.0014647	-0.0007487
512	0.0013632	-0.0009522
513	0.0011561	-0.0013651
514	0.0009613	-0.0017667
515	0.0007130	-0.0020694
516	0.0002539	-0.0022354
517	-0.0004696	-0.0022946
518	-0.0008992	-0.0023017
519	0.0017190	-0.0001560
137	0.0016763	-0.0003162
520	0.0016084	-0.0004863
139	0.0015229	-0.0006661
521	0.0014243	-0.0008573
140	0.0013175	-0.0010558
522	0.0011223	-0.0014461
141	0.0008945	-0.0017423
523	0.0005284	-0.0018939
142	-0.0000732	-0.0019243
524	-0.0004722	-0.0018955
143	-0.0008892	-0.0018812

LOADING - FOUR

X=0.80

RESULTANT JOINT DISPLACEMENTS - SUPPORTS

JOINT	/-----DISPLACEMENT-----/		
	X DISP.	Y DISP.	Z DISP.
1	0.0	-0.0105086	
525	0.0	-0.0102276	
2	0.0	-0.0099729	
526	0.0	-0.0097178	
3	0.0	-0.0094766	
527	0.0	-0.0090152	
4	0.0	-0.0086794	
528	0.0	-0.0084500	
5	0.0	-0.0082929	
529	0.0	-0.0080497	
6	0.0	-0.0078648	
530	0.0	-0.0077249	
7	0.0	-0.0076123	
531	0.0	-0.0075582	
8	0.0	-0.0074940	
80	0.0023490	0.0	
404	0.0023197	0.0	
95	0.0021940	0.0	
443	0.0020517	0.0	
114	0.0020392	0.0	
485	0.0021159	0.0	
129	0.0022310	0.0	
506	0.0022946	0.0	
126	0.0023514	0.0	

RESULTANT JOINT DISPLACEMENTS - FREE JOINTS

JOINT	/-----DISPLACEMENT-----/		
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147	0.0002722	-0.0102839
148	0.0001467	-0.0101116
149	0.0000837	-0.0098989
150	0.0000371	-0.0096547
9	0.0004720	-0.0102188
151	0.0002983	-0.0099509
10	0.0001764	-0.0097196
152	-0.0000220	-0.0092404
153	-0.0000853	-0.0088543
154	-0.0000654	-0.0085641
155	-0.0000532	-0.0083578
156	-0.0000317	-0.0081257
157	-0.0000564	-0.0079236
158	-0.0000696	-0.0078378
159	-0.0000833	-0.0077627
160	-0.0001213	-0.0076393
161	-0.0001482	-0.0075849
162	-0.0001831	-0.0075306
163	-0.0002285	-0.0074687
164	0.0005944	-0.0097979
165	0.0004156	-0.0095973
166	0.0001156	-0.0091769
16	0.0006721	-0.0095729
171	0.0003356	-0.0089943
17	-0.0000146	-0.0085512
172	-0.0001183	-0.0083535
18	-0.0001058	-0.0082387
173	-0.0000305	-0.0081441
19	-0.0000854	-0.0079358
174	-0.0001127	-0.0078405
20	-0.0001391	-0.0077550
175	-0.0001670	-0.0076796
21	-0.0002005	-0.0076147
176	-0.0002416	-0.0075571
22	-0.0002930	-0.0075036
177	-0.0003612	-0.0074501
23	-0.0004518	-0.0073929
178	0.0006591	-0.0091586
179	0.0004647	-0.0089196
180	0.0002164	-0.0082285
24	0.0005090	-0.0090881
181	0.0004121	-0.0086870
25	0.0003065	-0.0082799
182	-0.0001098	-0.0072947
183	0.0001290	-0.0073963
184	0.0000404	-0.0080883
185	-0.0000747	-0.0079063
186	-0.0001690	-0.0077049
187	-0.0002090	-0.0076181
188	-0.0002490	-0.0075419
189	-0.0003571	-0.0074204
190	-0.0004300	-0.0073699
191	-0.0005301	-0.0073200
192	-0.0006627	-0.0072639
193	0.0003496	-0.0089382
194	0.0003622	-0.0086965
195	0.0001491	-0.0079800
26	0.0003257	-0.0091594
196	0.0003207	-0.0085824
27	0.0003243	-0.0082032
197	0.0002367	-0.0080302
28	-0.0000137	-0.0078291
198	-0.0001709	-0.0076148

29	-0.0002793	-0.0074273
199	-0.0003890	-0.0072859
30	-0.0005554	-0.0071852
200	-0.0006854	-0.0071407
31	-0.0008573	-0.0070890
201	-0.0004015	-0.0092306
202	-0.0004450	-0.0090329
203	-0.0004235	-0.0086658
32	-0.0005425	-0.0095317
204	-0.0005991	-0.0092746
33	-0.0005880	-0.0090578
205	-0.0004804	-0.0086343
206	-0.0003926	-0.0082871
207	-0.0001083	-0.0079027
208	-0.0001382	-0.0074963
209	-0.0002930	-0.0072713
210	-0.0003500	-0.0071824
211	-0.0004054	-0.0071089
212	-0.0005594	-0.0069980
213	-0.0006696	-0.0069542
214	-0.0008216	-0.0069149
215	-0.0010266	-0.0068724
216	-0.0007938	-0.0094799
217	-0.0008011	-0.0093277
218	-0.0006327	-0.0088921
39	-0.0011190	-0.0095380
223	-0.0008702	-0.0090610
40	-0.0005942	-0.0086014
224	-0.0003844	-0.0082035
41	-0.0002004	-0.0078750
225	-0.0000870	-0.0073520
42	-0.0002844	-0.0070763
226	-0.0003579	-0.0069717
43	-0.0004179	-0.0069869
227	-0.0004779	-0.0068193
44	-0.0005505	-0.0067646
228	-0.0006432	-0.0067206
45	-0.0007648	-0.0066836
229	-0.0009342	-0.0066505
46	-0.0011686	-0.0066182
300	-0.0014653	-0.0092372
301	-0.0012052	-0.0090846
302	-0.0008039	-0.0086285
47	-0.0017747	-0.0090283
303	-0.0014187	-0.0087804
48	-0.0011285	-0.0085428
304	-0.0006661	-0.0080849
305	-0.0003614	-0.0077200
306	-0.0000417	-0.0071716
307	-0.0002635	-0.0068144
308	-0.0004214	-0.0066141
309	-0.0004796	-0.0065440
310	-0.0005402	-0.0064880
311	-0.0007114	-0.0064083
312	-0.0008378	-0.0063809
313	-0.0010193	-0.0063565
314	-0.0012717	-0.0063317
315	-0.0020760	-0.0063634
316	-0.0016017	-0.0082099
317	-0.0009300	-0.0078622
49	-0.0023306	-0.0076522
318	-0.0013578	-0.0074423
50	-0.0007382	-0.0072124
319	-0.0000893	-0.0067685
51	-0.0002250	-0.0064713
320	-0.0004049	-0.0062703

52	-0.0005319	-0.0061621
321	-0.0006637	-0.0060964
53	-0.0008854	-0.0060542
322	-0.0010736	-0.0060405
54	-0.0013371	-0.0060275
323	-0.0025136	-0.0067757
324	0.0019200	-0.0068043
325	0.0011003	-0.0067410
55	0.0025988	-0.0060724
326	0.0020659	-0.0060908
56	0.0016206	-0.0061144
327	0.0008692	-0.0061227
328	0.0003886	-0.0060536
329	-0.0001216	-0.0058917
330	-0.0003597	-0.0058068
331	-0.0005041	-0.0057721
332	-0.0005655	-0.0057597
333	-0.0006244	-0.0057476
334	-0.0007893	-0.0057259
335	-0.0009121	-0.0057181
336	-0.0010932	-0.0057153
337	-0.0013536	-0.0057164
338	0.0026457	-0.0054546
339	0.0021672	-0.0054708
340	0.0017460	-0.0055048
341	0.0013099	-0.0055294
62	0.0026611	-0.0048917
346	0.0022376	-0.0049038
63	0.0018481	-0.0049231
347	0.0013893	-0.0049425
64	0.0009939	-0.0049531
348	0.0004565	-0.0049952
65	0.0001178	-0.0050399
370	-0.0002434	-0.0051857
66	-0.0004394	-0.0052853
349	-0.0005108	-0.0053202
67	-0.0005773	-0.0053470
350	-0.0006413	-0.0053656
68	-0.0007113	-0.0053758
351	-0.0007960	-0.0053820
69	-0.0009101	-0.0053880
352	-0.0010780	-0.0053962
70	-0.0013264	-0.0054086
353	-0.0024289	-0.0047958
354	0.0020422	-0.0047993
71	0.0022240	-0.0046889
355	0.0021391	-0.0044737
356	0.0019437	-0.0045983
357	0.0016496	-0.0046353
358	0.0012023	-0.0046392
72	0.0020682	-0.0042360
359	0.0017374	-0.0042754
73	0.0014314	-0.0043091
360	0.0010292	-0.0043237
361	0.0007357	-0.0043759
362	0.0003078	-0.0045081
363	0.0020760	-0.0039006
364	0.0017032	-0.0039515
365	0.0012214	-0.0039641
74	0.0020482	-0.0035320
366	0.0014384	-0.0035554
75	0.0010666	-0.0036442
367	0.0007792	-0.0037575
76	0.0005515	-0.0038801
368	0.0002272	-0.0041290
369	-0.0000010	-0.0043464

371	-0.0003035	-0.0046728
372	-0.0004925	-0.0048785
373	-0.0005683	-0.0049483
374	-0.0006353	-0.0050003
375	-0.0007834	-0.0050604
376	-0.0008824	-0.0050806
377	-0.0010276	-0.0050988
378	-0.0012437	-0.0051235
379	0.0021229	-0.0030555
380	0.0016971	-0.0030727
381	0.0012471	-0.0032020
77	0.0021334	-0.0025106
382	0.0017473	-0.0025792
78	0.0014603	-0.0026975
383	0.0011188	-0.0029287
384	0.0008529	-0.0031385
385	0.0004574	-0.0035201
386	0.0021993	-0.0018990
387	0.0019809	-0.0019352
388	0.0017005	-0.0021316
389	0.0013213	-0.0024523
79	0.0022046	-0.0011321
397	0.0022529	-0.0005940
390	0.0021193	-0.0013622
81	0.0019357	-0.0015437
391	0.0015510	-0.0019431
82	0.0012186	-0.0022853
392	0.0007446	-0.0028383
83	0.0004044	-0.0032633
293	0.0001456	-0.0036077
84	-0.0000528	-0.0038878
394	-0.0003371	-0.0043202
85	-0.0005374	-0.0045890
395	-0.0006838	-0.0047370
86	-0.0008307	-0.0048138
396	-0.0009454	-0.0048415
87	-0.0011177	-0.0048817
398	0.0022737	-0.0005194
399	0.0021653	-0.0008107
400	0.0019821	-0.0010063
401	0.0016529	-0.0014247
402	0.0010892	-0.0021280
403	0.0006735	-0.0026667
88	0.0020146	-0.0007313
405	0.0014663	-0.0014393
89	0.0009931	-0.0020598
406	0.0006214	-0.0025800
407	0.0003375	-0.0030012
408	-0.0000756	-0.0036662
409	-0.0003699	-0.0041173
410	-0.0004828	-0.0042805
411	-0.0005757	-0.0044049
412	-0.0007099	-0.0045611
413	-0.0007650	-0.0046104
414	-0.0008347	-0.0046507
415	-0.0009411	-0.0047004
420	0.0021841	-0.0002757
421	0.0017992	-0.0008840
422	0.0013262	-0.0014968
423	0.0009167	-0.0020553
424	0.0020127	-0.0004927
96	0.0016211	-0.0010455
425	0.0012188	-0.0015793
97	0.0008542	-0.0020872
426	0.0002961	-0.0029431
98	-0.0001051	-0.0035770

427	-0.0002633	-0.0038305
99	-0.0004065	-0.0040406
428	-0.0005197	-0.0042063
100	-0.0005985	-0.0043278
429	-0.0006479	-0.0044188
101	-0.0006804	-0.0044924
430	-0.0007086	-0.0045507
102	-0.0007327	-0.0045562
431	0.0019943	-0.0004033
432	0.0017179	-0.0008473
433	0.0013809	-0.0013199
434	0.0017528	-0.0022126
435	0.0002512	-0.0029904
436	-0.0001452	-0.0036205
437	-0.0003061	-0.0038767
438	-0.0004470	-0.0040896
439	-0.0005746	-0.0043752
440	-0.0005775	-0.0044769
441	-0.0005706	-0.0045582
442	-0.0005208	-0.0046244
103	0.0017806	-0.0007353
444	0.0012175	-0.0015640
105	0.0006704	-0.0023887
445	0.0002079	-0.0031387
106	-0.0001823	-0.0037897
446	-0.0004700	-0.0042835
107	-0.0004614	-0.0045802
447	-0.0004279	-0.0047018
108	-0.0003328	-0.0047726
448	0.0019794	-0.0003286
449	0.0018264	-0.0006755
451	0.0016092	-0.0010390
452	0.0011077	-0.0018215
453	0.0006179	-0.0026150
454	0.0001738	-0.0033765
455	-0.0000317	-0.0037490
456	-0.0002467	-0.0041231
457	-0.0004269	-0.0046805
458	-0.0002455	-0.0048831
459	-0.0003268	-0.0049734
460	-0.0002958	-0.0049777
465	0.0020014	-0.0003089
115	0.0018801	-0.0006332
466	0.0017013	-0.0009750
117	0.0014917	-0.0013360
476	0.0010317	-0.0020794
118	0.0005831	-0.0028666
467	0.0003744	-0.0032835
119	0.0001763	-0.0037187
468	-0.0000296	-0.0041968
120	-0.0002939	-0.0047352
469	-0.0003279	-0.0051683
121	-0.0000048	-0.0054322
470	-0.0003075	-0.0052550
122	-0.0004158	-0.0051596
471	0.0020382	-0.0002962
472	0.0019400	-0.0005989
474	0.0017897	-0.0009182
475	0.0014020	-0.0015955
477	0.0009899	-0.0023313
478	0.0006019	-0.0031565
479	0.0004159	-0.0036233
480	0.0002578	-0.0041513
481	0.0000627	-0.0058106
482	-0.0001326	-0.0051640
483	-0.0003954	-0.0051343

484	-0.0006537	-0.0050640
123	0.0020037	-0.0005650
486	0.0017115	-0.0011703
125	0.0013455	-0.0018332
487	0.0009843	-0.0025574
126	0.0006723	-0.0034089
488	0.0004510	-0.0043393
127	-0.0001164	-0.0050443
489	-0.0005300	-0.0048503
128	-0.0009591	-0.0047152
490	0.0021451	-0.0002634
491	0.0020705	-0.0005304
493	0.0019544	-0.0008045
494	0.0016456	-0.0013886
495	0.0013060	-0.0020145
496	0.0010074	-0.0026923
497	0.0007467	-0.0033880
498	0.0002691	-0.0039545
499	-0.0006452	-0.0041494
500	-0.0011715	-0.0041222
501	0.0022078	-0.0002422
130	0.0021386	-0.0004890
502	0.0020316	-0.0007422
132	0.0018964	-0.0010048
503	0.0015833	-0.0015550
133	0.0012803	-0.0021295
504	0.0009964	-0.0026948
134	0.0005995	-0.0031385
505	-0.0001506	-0.0033693
135	-0.0012310	-0.0034262
507	0.0022715	-0.0002163
508	0.0022056	-0.0004370
510	0.0021041	-0.0006665
511	0.0019741	-0.0009059
512	0.0018258	-0.0011559
513	0.0015202	-0.0016673
514	0.0012316	-0.0021685
515	0.0008838	-0.0025470
516	0.0002794	-0.0027535
517	-0.0006566	-0.0028251
518	-0.0012101	-0.0028338
519	0.0023309	-0.0001812
137	0.0022689	-0.0003684
520	0.0021699	-0.0005699
139	0.0020450	-0.0007854
521	0.0019008	-0.0010181
140	0.0017449	-0.0012622
522	0.0014550	-0.0017469
141	0.0011280	-0.0021194
523	0.0006375	-0.0023109
142	-0.0001457	-0.0023473
524	-0.0006601	-0.0023107
143	-0.0011972	-0.0022926

LOADING - FIVE X=1.00

RESULTANT JOINT DISPLACEMENTS - SUPPORTS

JOINT /-----DISPLACEMENT-----/

X DISP. Y DISP. Z DISP.

1 0.0 -0.0117447

525	0.0	-0.0114627
2	0.0	-0.0112080
526	0.0	-0.0109546
3	0.0	-0.0107172
527	0.0	-0.0102701
4	0.0	-0.0099653
528	0.0	-0.0097784
5	0.0	-0.0096679
529	0.0	-0.0094988
6	0.0	-0.0093574
530	0.0	-0.0092363
7	0.0	-0.0091249
531	0.0	-0.0090665
8	0.0	-0.0089966
80	0.0030945	0.0
404	0.0030434	0.0
95	0.0028597	0.0
443	0.0026438	0.0
114	0.0026014	0.0
485	0.0026763	0.0
129	0.0028008	0.0
506	0.0028708	0.0
136	0.0029318	0.0

RESULTANT JOINT DISPLACEMENTS - FREE JOINTS

JOINT	DISPLACEMENT		
	X DISP.	Y DISP.	Z DISP.
147	0.0002737	-0.0115147	
148	0.0001425	-0.0113425	
149	0.0000773	-0.0111301	
150	0.0000297	-0.0108876	
9	0.0004731	-0.0114361	
151	0.0002895	-0.0111686	
10	0.0001630	-0.0109394	
152	-0.0000380	-0.0104664	
153	-0.0000854	-0.0101030	
154	-0.0000465	-0.0098503	
155	-0.0000250	-0.0096892	
156	-0.0000015	-0.0095482	
157	-0.0000393	-0.0094013	
158	-0.0000593	-0.0093325	
159	-0.0000802	-0.0092684	
160	-0.0001308	-0.0091528	
161	-0.0001628	-0.0090968	
162	-0.0002021	-0.0090383	
163	-0.0002504	-0.0089703	
164	-0.0005854	-0.0109965	
165	0.0003984	-0.0107922	
166	0.0000941	-0.0103812	
16	0.0006433	-0.0107557	
171	0.0003098	-0.0101676	
17	-0.0000459	-0.0097380	
172	-0.0001092	-0.0095835	
18	-0.0000615	-0.0095295	
173	0.0000380	-0.0095503	
19	-0.0000391	-0.0094037	
174	-0.0000801	-0.0093284	
20	-0.0001205	-0.0092562	
175	-0.0001618	-0.0091884	
21	-0.0002082	-0.0091272	
176	-0.0002613	-0.0090697	

22	-0.0003230	-0.0090137
177	-0.0003999	-0.0089554
23	-0.0004966	-0.0088915
178	0.0005997	-0.0103328
179	0.0004146	-0.0100861
180	0.0001884	-0.0093733
24	0.0004074	-0.0102759
181	0.0003361	-0.0098596
25	0.0002525	-0.0094351
182	-0.0001650	-0.0083982
183	0.0001913	-0.0091521
184	0.0001517	-0.0094973
185	0.0000109	-0.0093806
186	-0.0001249	-0.0092085
187	-0.0001857	-0.0091281
188	-0.0002447	-0.0090543
189	-0.0003883	-0.0089302
190	-0.0004764	-0.0088757
191	-0.0005398	-0.0088201
192	-0.0007327	-0.0087569
193	0.0002034	-0.0101730
194	0.0002620	-0.0099230
195	0.0001096	-0.0091841
26	0.0001472	-0.0104706
196	0.0002560	-0.0098884
27	0.0003588	-0.0095435
197	0.0003920	-0.0094839
28	0.0001174	-0.0093320
198	-0.0000930	-0.0091360
29	-0.0002562	-0.0089453
199	-0.0004124	-0.0087954
30	-0.0006197	-0.0086825
200	-0.0007676	-0.0086314
31	-0.0009545	-0.0085718
201	0.0002043	-0.0106410
202	0.0003291	-0.0104422
203	0.0004395	-0.0101007
32	0.0003416	-0.0110554
204	0.0004926	-0.0108033
33	0.0005603	-0.0105979
205	0.0005857	-0.0102007
206	0.0005707	-0.0098724
207	0.0002859	-0.0093922
208	-0.0000240	-0.0090638
209	-0.0002466	-0.0088055
210	-0.0003331	-0.0087027
211	-0.0004152	-0.0086177
212	-0.0006196	-0.0084887
213	-0.0007532	-0.0084371
214	-0.0009278	-0.0083903
215	-0.0011537	-0.0083393
216	0.0006006	-0.0111249
217	0.0007131	-0.0109772
218	0.0007140	-0.0105637
39	0.0009375	-0.0113133
223	0.0009077	-0.0108538
40	0.0007716	-0.0104037
224	0.0006069	-0.0099892
41	0.0004167	-0.0096167
225	0.0000600	-0.0089981
42	-0.0002151	-0.0086443
226	-0.0003238	-0.0085096
43	-0.0004136	-0.0084011
227	-0.0005012	-0.0083152
44	-0.0006011	-0.0082461
228	-0.0007208	-0.0081909

45	-0.0008689	-0.0081445
229	-0.0010653	-0.0081030
46	-0.0013271	-0.0080625
300	0.0012969	-0.0111644
301	0.0011810	-0.0110203
302	0.0009687	-0.0105759
47	0.0016185	-0.0111461
303	0.0014431	-0.0108986
48	0.0012727	-0.0106598
304	0.0009157	-0.0101750
305	0.0006095	-0.0097156
306	0.0001231	-0.0089445
307	-0.0001795	-0.0084314
308	-0.0004069	-0.0081393
309	-0.0004929	-0.0080384
310	-0.0005812	-0.0079587
311	-0.0008075	-0.0078480
312	-0.0009623	-0.0078106
313	-0.0011753	-0.0077777
314	-0.0014622	-0.0077442
315	0.0019404	-0.0107597
316	0.0017028	-0.0106150
317	0.0011964	-0.0101584
49	0.0022980	-0.0105011
318	0.0016155	-0.0100342
50	0.0012174	-0.0095453
319	0.0002566	-0.0086987
51	-0.0001450	-0.0081629
320	-0.0003872	-0.0078082
52	-0.0005670	-0.0076180
321	-0.0007502	-0.0075085
53	-0.0010297	-0.0074422
322	-0.0012533	-0.0074207
54	-0.0015583	-0.0073992
323	0.0026367	-0.0099014
324	0.0021530	-0.0097499
325	0.0013818	-0.0093075
55	0.0029041	-0.0094098
326	0.0023588	-0.0091546
56	0.0018985	-0.0089308
327	0.0010818	-0.0085025
328	0.0005371	-0.0081451
329	-0.0000602	-0.0076133
330	-0.0003523	-0.0073413
331	-0.0005390	-0.0072058
332	-0.0006231	-0.0071608
333	-0.0007038	-0.0071243
334	-0.0009205	-0.0070718
335	-0.0010746	-0.0070545
336	-0.0012939	-0.0070446
337	-0.0016017	-0.0070390
338	0.0030845	-0.0085230
339	0.0025163	-0.0083416
340	0.0020383	-0.0081810
341	0.0015352	-0.0080073
62	0.0031764	-0.0077398
346	0.0026231	-0.0074979
63	0.0021725	-0.0073375
347	0.0016121	-0.0071938
64	0.0011402	-0.0070582
348	0.0005259	-0.0068569
65	0.0001384	-0.0067340
370	-0.0002529	-0.0066762
66	-0.0004811	-0.0066740
349	-0.0005684	-0.0066740
67	-0.0006538	-0.0066745

350	-0.0007384	-0.0066739
68	-0.0008312	-0.0066697
351	-0.0009418	-0.0066656
69	-0.0010875	-0.0066640
352	-0.0012954	-0.0066666
70	-0.0015964	-0.0066744
353	0.0028607	-0.0074028
354	0.0024037	-0.0072096
71	0.0026212	-0.0070786
355	0.0025766	-0.0066284
356	0.0023227	-0.0066139
357	0.0019360	-0.0067964
358	0.0013776	-0.0066695
72	0.0025450	-0.0061740
359	0.0020739	-0.0062159
73	0.0016639	-0.0062216
360	0.0011616	-0.0061414
361	0.0008130	-0.0061145
362	0.0003276	-0.0061127
363	0.0026061	-0.0056046
364	0.0020546	-0.0056800
365	0.0014015	-0.0056431
74	0.0026016	-0.0050135
366	0.0017056	-0.0050418
75	0.0012158	-0.0051209
367	0.0008584	-0.0052187
76	0.0005901	-0.0053217
368	0.0002286	-0.0055309
369	-0.0000220	-0.0057134
371	-0.0003491	-0.0059682
372	-0.0005659	-0.0061327
373	-0.0006588	-0.0061879
374	-0.0007450	-0.0062290
375	-0.0009402	-0.0062743
376	-0.0010704	-0.0062900
377	-0.0012564	-0.0063047
378	-0.0015272	-0.0063263
379	0.0027405	-0.0042903
380	0.0021046	-0.0043176
381	0.0014607	-0.0044874
77	0.0027718	-0.0034943
382	0.0021984	-0.0035904
78	0.0017786	-0.0037544
383	0.0013042	-0.0040609
384	0.0009642	-0.0043160
385	0.0004895	-0.0047470
386	0.0028777	-0.0026259
387	0.0025569	-0.0026707
388	0.0021424	-0.0029411
389	0.0015956	-0.0033802
79	0.0028901	-0.0015558
390	0.0029607	-0.0008155
391	0.0027624	-0.0018685
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82	0.0014650	-0.0031192
393	0.0008476	-0.0038289
83	0.0004409	-0.0043303
394	0.0001409	-0.0047153
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399	0.0028760	-0.0010930
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413	-0.0008749	-0.0056291
414	-0.0009596	-0.0056812
415	-0.0010671	-0.0057232
416	-0.0012241	-0.0057757
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455	-0.0005592	-0.0057168
456	0.0025339	-0.0003940
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459	0.0013813	-0.0022081
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457	-0.0005512	-0.0055531
458	-0.0003720	-0.0057373
459	-0.0005048	-0.0053931
460	-0.0005161	-0.0058994
465	0.0025509	-0.0003658
115	0.0023384	-0.0007525
466	0.0021502	-0.0011623
117	0.0018739	-0.0015970
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119	0.0011961	-0.0044026
468	-0.0000572	-0.0049482
120	-0.0003734	-0.0055575
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121	-0.0000852	-0.0063568
470	-0.0004775	-0.0061622
122	-0.0006478	-0.0060562
471	0.0025867	-0.0003477
472	0.0024555	-0.0007039
474	0.0022555	-0.0013823
475	0.0017444	-0.0018857
477	0.0012084	-0.0027530
478	0.0007098	-0.0037138
479	0.0004739	-0.0042509
480	0.0002720	-0.0048537
481	0.0000159	-0.0067327
482	-0.0002270	-0.0060123
483	-0.0005727	-0.0059805
484	-0.0009113	-0.0059021
123	0.0025266	-0.0006568
486	0.0021380	-0.0013658
125	0.0016540	-0.0021439
487	0.0011798	-0.0029878
126	0.0007700	-0.0039691
488	0.0004727	-0.0050327
127	-0.0002037	-0.0058346
489	-0.0007223	-0.0056151
128	-0.0012521	-0.0054632
490	0.0027008	-0.0003024
491	0.0026012	-0.0006096
493	0.0024462	-0.0009260
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495	0.0015824	-0.0023319
496	0.0011820	-0.0031159
497	0.0008332	-0.0039160
498	0.0002468	-0.0045647
499	-0.0008522	-0.0047814
500	-0.0014874	-0.0047515
501	0.0027697	-0.0002740
130	0.0026772	-0.0005539
502	0.0025342	-0.0008423
132	0.0023535	-0.0011431
503	0.0019340	-0.0017762
133	0.0015255	-0.0024401
504	0.0011450	-0.0030922
134	0.0006436	-0.0036033
505	-0.0002592	-0.0038656
135	-0.0015512	-0.0039293
507	0.0028400	-0.0002391
508	0.0027518	-0.0004843
510	0.0026160	-0.0007410
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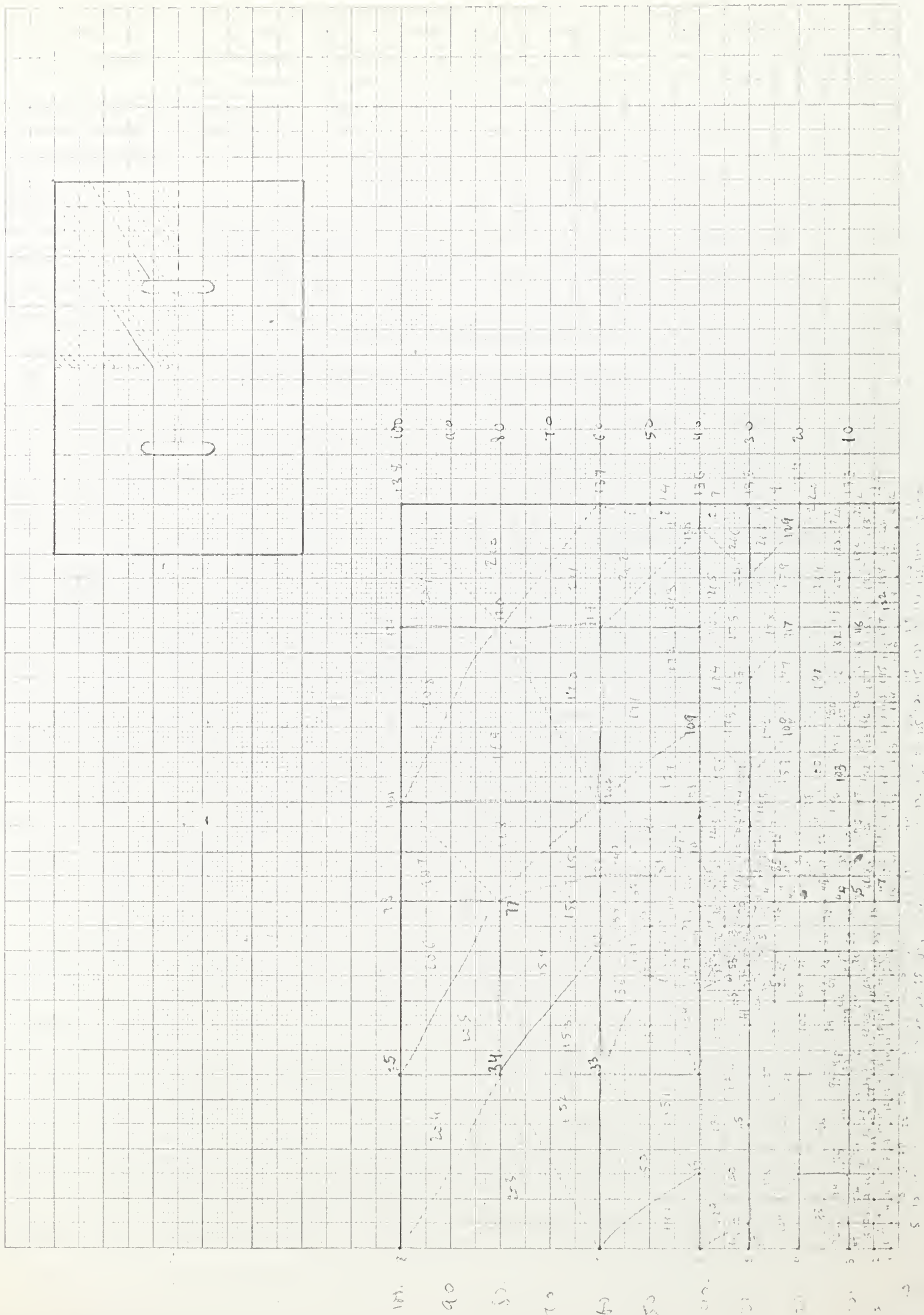
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519	0.0029044	-0.0001922
137	0.0028215	-0.0003923
520	0.0026888	-0.0006116
139	0.0025215	-0.0008496
521	0.0023286	-0.0011114
140	0.0021200	-0.0013892
522	0.0017281	-0.0019461
141	0.0012974	-0.0023797
523	0.0006880	-0.0026039
142	-0.0002566	-0.0026451
524	-0.0008703	-0.0026025
143	-0.0015106	-0.0025815

APPENDIX 6

H-slit , 'CSTG' type .

The following presents :

- 1- Plate division , dark numbers are element names , light numbers are node names , page 220 .
- 2- Input data , pp 221 - 234 .
- 3- output data , pp 235 - 247 .



APPENDIX A IH-SLIT

TYPE PLANE STRESS

UNITS MILLIMETERS

UNITS KILOGRAMS

JOINT COORDINATES

1	0.0	1.5	5
2	0.0	5.0	5
3	0.0	10.0	5
4	0.0	20.0	5
5	0.0	20.0	5
6	0.0	40.0	5
7	0.0	60.0	5
8	0.0	100.0	5
9	5.0	1.5	
10	5.0	5.0	
11	5.0	10.0	
12	5.0	20.0	
13	10.0	1.5	
14	10.0	5.0	
15	15.0	1.5	
16	15.0	5.0	
17	15.0	10.0	
18	15.0	20.0	
19	15.0	40.0	
20	20.0	1.5	
21	20.0	5.0	

22 25.0 1.5

23 25.0 5.0

24 25.0 10.0

25 25.0 30.0

26 30.0 1.5

27 30.0 5.0

28 35.0 1.5

29 35.0 5.0

30 35.0 10.0

31 35.0 20.0

32 35.0 40.0

33 35.0 60.0

34 35.0 80.0

35 35.0 100.0

36 40.0 1.5

37 40.0 5.0

38 45.0 1.5

39 45.0 5.0

40 45.0 10.0

41 45.0 30.0

42 50.0 1.5

43 50.0 5.0

44 50.0 15.0

45 50.0 25.0

46 52.0 30.0

47 52.0 40.0

48 55.0 1.5

49 55.0 5.0

50 55.0 10.0

51 55.0 20.0

52 55.0 25.0

53 55.0 34.0

54 55.0 50.0

55 57.0 30.0

56 57.0 37.0

57 60.0 1.5

58 60.0 5.0

59 60.0 10.0

60 60.0 15.0

61 60.0 25.0

62 60.0 60.0

63 61.0 33.0

64 61.0 40.0

65 61.5 28.6

66 65.0 30.0

67 65.0 35.0

68 65.0 50.0

69 68.5 28.6

70 69.0 33.0

71 69.0 40.0

72 70.0 0.0 S

73 70.0 5.0

74 70.0 10.0

75 70.0 15.0

76 70.0 25.0

77 70.0 80.0

78 70.0 100.0

79 73.0 30.0

80 73.0 37.0

81 75.0 0.0 S

82 75.0 5.0

83 75.0 10.0

84 75.0 20.0

85 75.0 25.0

86 75.0 35.0

87 75.0 50.0

88 75.0 60.0

224

89 78.0 30.0

90 78.0 40.0

91 80.0 5.0

92 80.0 15.0

93 80.0 25.0

94 85.0 0.0 S

95 85.0 10.0

96 85.0 30.0

97 90.0 5.0

98 90.0 20.0

99 90.0 40.0

100 90.0 60.0

101 90.0 100.0

102 95.0 0.0 S

103 95.0 10.0

104 95.0 30.0

105 100.0 5.0

106 105.0 0.0 S

107 105.0 10.0

108 105.0 20.0

109 105.0 40.0

110 110.0 5.0

111 115.0 0.0 S

112 115.0 10.0

113 115.0 30.0

114 120.0 5.0

115 125.0 0.0 S

116 125.0 10.0

117 125.0 20.0

118 125.0 40.0

119 125.0 60.0

120 125.0 80.0

121 125.0 100.0

122 130.0 5.0

123 135.0 0.0 S

124 135.0 10.0

125 135.0 30.0

126 140.0 5.0

127 145.0 0.0 S

128 145.0 10.0

129 145.0 20.0

130 145.0 40.0

131 150.0 0.0 S

132 150.0 5.0

133 150.0 10.0

134 150.0 20.0

135 150.0 30.0

136 150.0 40.0

137 150.0 60.0

138 150.0 100.0

ELEMENT INCIDENCES

1 2 1 9

2 2 9 10

3 10 9 14

4 14 9 13

5 14 13 15

6 14 15 16

7 16 15 21

8 15 20 21

9 21 20 22

10 21 22 23

11 23 22 27

12 22 26 27

13 27 26 28

14 27 28 29

15 29 28 37

16 28 36 37

17 37 36 38

18 37 38 39

19 39 38 43

20 42 43 38

21 43 42 48

22 43 48 49

23 49 48 58

24 48 57 58

25 49 58 50

26 50 58 59

27 50 59 60

28 50 60 51

29 51 60 61

30 52 51 61

31 52 61 55

32 55 61 65

33 55 65 63

34 63 65 66

35 63 66 67

36 67 66 70

37 70 66 69

38 70 69 79

39 79 69 76

40 79 76 85

41 76 84 85

42 76 75 84

43 75 83 84

44 75 74 83

45 74 73 83

46 73 82 83

47 73 81 82

48 73 72 81

49 3 2 11

50 2 10 11

51 11 10 14

52 11 14 17

53 14 16 17

54 17 16 21

55 17 21 24

56 21 23 24

57 24 23 27

58 24 27 30

59 27 29 30

60 30 29 37

61 30 37 40

62 37 39 40

63 40 39 43

64 40 43 50

65 43 49 50

66 40 50 44

67 44 50 51

68 44 51 45

69 45 51 52

70 45 52 46

71 46 52 55

72 46 55 53

73 53 55 56

74 56 55 63

75 56 63 64

76 64 63 67

77 64 67 71

78 67 70 71

79 71 70 80

80 80 70 86

81 70 79 86

228

82 86 79 89

83 79 85 89

84 89 85 93

85 93 85 84

86 84 92 93

87 84 83 92

88 83 91 92

89 83 82 91

90 82 81 91

91 81 94 91

92 3 11 4

93 4 11 18

94 18 11 17

95 18 17 24

96 18 24 31

97 24 30 31

98 31 30 40

99 31 40 44

100 31 44 45

101 31 45 41

102 41 45 46

103 41 46 47

104 47 46 53

105 47 53 56

106 47 56 64

107 54 47 64

108 54 64 68

109 68 64 71

110 68 71 87

111 87 71 90

112 71 80 90

113 90 80 86

211

114 86 89 90

115 90 89 96

116 89 93 96

117 96 93 98

118 93 92 98

119 98 92 95

120 92 91 95

121 95 91 97

122 91 94 97

123 5 4 12

124 12 4 18

125 12 18 25

126 25 18 31

127 25 31 41

128 6 5 12

129 6 12 19

130 19 12 25

131 19 25 32

132 32 25 41

133 32 41 47

134 32 47 54

135 32 54 33

136 33 54 62

137 54 68 62

138 62 68 88

139 68 87 88

140 88 87 100

141 87 99 100

142 87 90 99

143 90 96 99

144 96 104 99

145 96 98 104

146 98 95 103

147 95 97 103

230

148 97 94 102

149 6 19 7

150 7 19 33

151 19 32 33

152 7 33 34

153 34 33 62

154 34 62 77

155 77 62 88

156 77 88 100

157 100 99 109

158 99 104 109

159 104 98 108

160 98 103 108

161 103 107 108

162 103 97 105

163 103 105 107

164 97 102 105

165 105 102 106

166 105 110 107

167 105 106 110

168 77 100 101

169 100 120 101

170 100 119 120

171 100 109 119

172 109 118 119

173 109 104 113

174 109 113 118

175 118 113 125

176 104 108 113

177 108 117 113

178 113 117 125

179 125 117 129

180 108 107 112

181 108 112 117

182 112 116 117

183 117 116 124

184 117 124 129

185 124 128 129

186 107 110 112

187 110 114 112

188 112 114 116

189 116 114 122

190 116 122 124

191 124 122 126

192 124 126 128

193 128 126 132

194 106 111 110

195 110 111 114

196 114 111 115

197 114 115 122

198 115 123 122

199 122 123 126

200 126 123 127

201 126 127 132

202 127 131 132

203 7 34 8

204 8 34 35

205 35 34 77

206 35 77 78

207 78 77 101

208 101 120 121

209 121 120 138

210 120 137 138

211 120 119 137

212 119 130 137

213 119 118 130

232

214 130 136 137

215 118 125 130

216 130 125 135

217 130 135 136

218 125 129 135

219 135 129 134

220 129 133 134

221 129 128 133

222 128 132 133

ELEMENT PROPERTIES

1 TO 222 TYPE 'CSTG' THICKNESS 5.0

CONSTANTS

E 21100. ALL

POISSON .3 ALL

JOINT RELEASES

1 TO 8 FORCE Y

72 81 94 102 106 111 115 123 127 131 FORCE X

LOADING 'ONE' 'R=0.33'

JOINT LOADS

1 FORCE Y -125.0

9 FORCE Y -250.0

13 FORCE Y -250.0

15 FORCE Y -250.0

20 FORCE Y -125.0

LOADING 'TWO' 'R=0.50'

JOINT LOADS

1 FORCE Y -125.0

9 FORCE Y -250.0

13 FORCE Y -250.0

15 FORCE Y -250.0

20 FORCE Y -250.0

22 FORCE Y -250.0

1000
500 kg
20

832

LOADING 'THREE' 'R=0.66'

JOINT LOADS

1 FORCE Y -125.0

9 FORCE Y -250.0

13 FORCE Y -250.0

15 FORCE Y -250.0

20 FORCE Y -250.0

22 FORCE Y -250.0

26 FORCE Y -250.0

28 FORCE Y -250.0

36 FORCE Y -125.0

LOADING 'FOUR' 'R=0.83'

JOINT LOADS

1 FORCE Y -125.0

9 FORCE Y -250.0

13 FORCE Y -250.0

15 FORCE Y -250.0

20 FORCE Y -250.0

22 FORCE Y -250.0

26 FORCE Y -250.0

28 FORCE Y -250.0

36 FORCE Y -250.0

38 FORCE Y -250.0

42 FORCE Y -125.0

LOADING 'FIVE' 'R=1.0'

JOINT LOADS

1 FORCE Y -125.0

9 FORCE Y -250.0

13 FORCE Y -250.0

15 FORCE Y -250.0

20 FORCE Y -250.0

22 FORCE Y -250.0

26 FORCE Y -250.0

234

28 FORCE Y -250.0

36 FORCE Y -250.0

38 FORCE Y -250.0

42 FORCE Y -250.0

48 FORCE Y -250.0

57 FORCE Y -125.0

STIFFNESS ANALYSIS

LIST DISPLACEMENTS STRESSES ALL

LOADING - ONE

R=0.33

RESULTANT JOINT DISPLACEMENTS - SUPPORTS

JCINT	/-----DISPLACEMENT-----/		
	X DISP.	Y DISP.	Z DISP.
1	0.0	-0.0603966	
2	0.0	-0.0594468	
3	0.0	-0.0576410	
4	0.0	-0.0548952	
5	0.0	-0.0516929	
6	0.0	-0.0495426	
7	0.0	-0.0469618	
8	0.0	-0.0436242	
72	0.0094846	0.0	
81	0.0101828	0.0	
94	0.0111303	0.0	
102	0.0115812	0.0	
106	0.0117069	0.0	
111	0.0116545	0.0	
115	0.0115449	0.0	
123	0.0113149	0.0	
127	0.0109909	0.0	
131	0.0107025	0.0	

RESULTANT JOINT DISPLACEMENTS - FREE JOINTS

JCINT	/-----DISPLACEMENT-----/		
	X DISP.	Y DISP.	Z DISP.
9	0.0023112	-0.0599629	
10	0.0016332	-0.0587361	
11	0.0009699	-0.0572288	
12	-0.0000838	-0.0513172	
13	0.0044323	-0.0582331	
14	0.0031406	-0.0572006	
15	0.0063772	-0.0559198	
16	0.0044664	-0.0546722	
17	0.0026746	-0.0532781	
18	0.0006865	-0.0509567	
19	-0.0005046	-0.0468998	
20	0.0081164	-0.0512993	
21	0.0054060	-0.0508393	
22	0.0089855	-0.0464355	
23	0.0066415	-0.0466015	
24	0.0041497	-0.0465903	
25	0.0003240	-0.0450660	
26	0.0096174	-0.0431111	
27	0.0075242	-0.0431986	
28	0.0100669	-0.0400898	
29	0.0082073	-0.0402264	
30	0.0060420	-0.0403277	
31	0.0031658	-0.0404738	

32	-0.0002184	-0.0401168
33	-0.0027739	-0.0390707
34	-0.0055505	-0.0381519
35	-0.0099883	-0.0367230
36	0.0103339	-0.0375397
37	0.0086880	-0.0375696
38	0.0104803	-0.0351463
39	0.0089846	-0.0351999
40	0.0071875	-0.0352020
41	0.0024572	-0.0354174
42	0.0105016	-0.0330911
43	0.0091414	-0.0330806
44	0.0062001	-0.0328712
45	0.0039963	-0.0328676
46	0.0032561	-0.0317370
47	0.0006737	-0.0315697
48	0.0104591	-0.0311325
49	0.0091840	-0.0311276
50	0.0074949	-0.0310435
51	0.0054567	-0.0306526
52	0.0044915	-0.0303998
53	0.0025357	-0.0300203
54	-0.0015153	-0.0297884
55	0.0039542	-0.0290964
56	0.0017692	-0.0286136
57	0.0104216	-0.0294274
58	0.0091720	-0.0294332
59	0.0075719	-0.0295053
60	0.0063717	-0.0294807
61	0.0048258	-0.0282849
62	-0.0035660	-0.0270376
63	0.0033037	-0.0262223
64	0.0010437	-0.0258942
65	0.0048932	-0.0263705
66	0.0052576	-0.0222105
67	0.0027956	-0.0224143
68	-0.0012269	-0.0235052
69	0.0065509	-0.0169915
70	0.0040841	-0.0179832
71	0.0016543	-0.0195592
73	0.0094573	-0.0022953
74	0.0091941	-0.0046428
75	0.0089395	-0.0071055
76	0.0078533	-0.0131868
77	-0.0087023	-0.0219912
78	-0.0149055	-0.0214369
79	0.0062510	-0.0136131
80	0.0031921	-0.0161182
82	0.0100573	-0.0020960
83	0.0099141	-0.0042192
84	0.0091488	-0.0086029
85	0.0080574	-0.0106319
86	0.0043178	-0.0140657
87	-0.0003827	-0.0171868
88	-0.0030721	-0.0183481
89	0.0065699	-0.0109842
90	0.0027871	-0.0136821
91	0.0106636	-0.0018188
92	0.0100757	-0.0054835
93	0.0083443	-0.0086012
95	0.0108401	-0.0030569
96	0.0071071	-0.0082332
97	0.0113212	-0.0012734
98	0.0097233	-0.0046977
99	0.0040727	-0.0086126
100	-0.0021690	-0.0114540

101	-0.0153683	-0.0129586
103	0.0111636	-0.0020196
104	0.0074970	-0.0054907
105	0.0115549	-0.0008025
107	0.0111854	-0.0011830
108	0.0099645	-0.0023424
109	0.0050361	-0.0045927
110	0.0115795	-0.0004125
112	0.0112805	-0.0005533
113	0.0078895	-0.0016493
114	0.0115030	-0.0001402
116	0.0110585	0.0000482
117	0.0098789	0.0000936
118	0.0051061	0.0000870
119	-0.0010550	-0.0000050
120	-0.0077965	-0.0003537
121	-0.0147516	-0.0005200
122	0.0113350	0.0001914
124	0.0109417	0.0006692
125	0.0077315	0.0018635
126	0.0110626	0.0004883
128	0.0105146	0.0013495
129	0.0093603	0.0025438
130	0.0050552	0.0045468
132	0.0106360	0.0008839
133	0.0103142	0.0017358
134	0.0091191	0.0032421
135	0.0072547	0.0045619
136	0.0049158	0.0057944
137	-0.0011751	0.0069375
138	-0.0144677	0.0075483

237

LOADING - TWO

R=0.50

RESULTANT JOINT DISPLACEMENTS - SUPPORTS

JCINT /-----DISPLACEMENT-----/

	X DISP.	Y DISP.	Z DISP.
1	0.0	-0.0831649	
2	0.0	-0.0822756	
3	0.0	-0.0805988	
4	0.0	-0.0778629	
5	0.0	-0.0744478	
6	0.0	-0.0719271	
7	0.0	-0.0686974	
8	0.0	-0.0639965	
72	0.0141539	0.0	
81	0.0151969	0.0	
94	0.0166110	0.0	
102	0.0172828	0.0	
106	0.0174701	0.0	
111	0.0173931	0.0	
115	0.0172322	0.0	
123	0.0168931	0.0	
127	0.0164152	0.0	
131	0.0159887	0.0	

RESULTANT JOINT DISPLACEMENTS - FREE JOINTS

237

	X DISP.	Y DISP.	Z DISP.
9	0.0026702	-0.0828182	
10	0.0021107	-0.0817021	
11	0.0015201	-0.0803047	
12	0.0001746	-0.0741282	
13	0.0052100	-0.0814128	
14	0.0041355	-0.0804658	
15	0.0076452	-0.0795391	
16	0.0060204	-0.0783687	
17	0.0041795	-0.0769282	
18	0.0018077	-0.0740731	
19	-0.0003683	-0.0685660	
20	0.0098885	-0.0765035	
21	0.0077074	-0.0754935	
22	0.0119113	-0.0728663	
23	0.0091599	-0.0716518	
24	0.0061781	-0.0702744	
25	0.0009854	-0.0663891	
26	0.0136484	-0.0670885	
27	0.0102218	-0.0666077	
28	0.0144762	-0.0612578	
29	0.0115297	-0.0614405	
30	0.0084478	-0.0614481	
31	0.0045327	-0.0609726	
32	-0.0000490	-0.0593643	
33	-0.0038929	-0.0576265	
34	-0.0080128	-0.0562619	
35	-0.0145131	-0.0541588	
36	0.0150015	-0.0570707	
37	0.0123732	-0.0571250	
38	0.0152528	-0.0532005	
39	0.0128910	-0.0532890	
40	0.0101308	-0.0532611	
41	0.0035608	-0.0531154	
42	0.0152683	-0.0499941	
43	0.0131560	-0.0499713	
44	0.0087977	-0.0496157	
45	0.0057388	-0.0493910	
46	0.0047257	-0.0476073	
47	0.0010049	-0.0471621	
48	0.0151870	-0.0469719	
49	0.0132337	-0.0469659	
50	0.0106758	-0.0468278	
51	0.0077827	-0.0461590	
52	0.0064619	-0.0456950	
53	0.0036942	-0.0449719	
54	-0.0021590	-0.0443429	
55	0.0057672	-0.0436593	
56	0.0025790	-0.0428196	
57	0.0151223	-0.0443860	
58	0.0132157	-0.0443960	
59	0.0108043	-0.0445181	
60	0.0090550	-0.0444797	
61	0.0069433	-0.0425497	
62	-0.0051732	-0.0402020	
63	0.0048285	-0.0393007	
64	0.0015138	-0.0387165	
65	0.0071570	-0.0395796	
66	0.0077610	-0.0332665	
67	0.0040906	-0.0335466	
68	-0.0017835	-0.0350496	
69	0.0097395	-0.0254099	
70	0.0060296	-0.0268926	

71	0.0024260	-0.0292294
73	0.0141132	-0.0034291
74	0.0137195	-0.0069366
75	0.0133384	-0.0106168
76	0.0117062	-0.0197095
77	-0.0127542	-0.0327066
78	-0.0218533	-0.0318510
79	0.0092964	-0.0203373
80	0.0047249	-0.0240835
82	0.0150093	-0.0031307
83	0.0147954	-0.0063022
84	0.0136483	-0.0128499
85	0.0120114	-0.0158802
86	0.0064121	-0.0210090
87	-0.0005357	-0.0256489
88	-0.0044726	-0.0273472
89	0.0097819	-0.0164011
90	0.0041435	-0.0204282
91	0.0159146	-0.0027159
92	0.0150350	-0.0081877
93	0.0124424	-0.0128411
95	0.0161770	-0.0045638
96	0.0105965	-0.0122912
97	0.0168952	-0.0019010
98	0.0145079	-0.0070125
99	0.0060881	-0.0128634
100	-0.0031419	-0.0171022
101	-0.0226133	-0.0193237
103	0.0166591	-0.0030150
104	0.0111904	-0.0082022
105	0.0172433	-0.0011987
107	0.0166931	-0.0017695
108	0.0148739	-0.0035042
109	0.0075433	-0.0068785
110	0.0172808	-0.0006185
112	0.0168364	-0.0008331
113	0.0117932	-0.0024858
114	0.0171687	-0.0002139
116	0.0165091	0.0000601
117	0.0147550	0.0001160
118	0.0076665	0.0000827
119	-0.0014653	-0.0000760
120	-0.0114495	-0.0006102
121	-0.0217504	-0.0008524
122	0.0169214	0.0002784
124	0.0163383	0.0009820
125	0.0115687	0.0027318
126	0.0165199	0.0007191
128	0.0157074	0.0019920
129	0.0139921	0.0037531
130	0.0076012	0.0067009
132	0.0158898	0.0013067
133	0.0154116	0.0025658
134	0.0136359	0.0047899
135	0.0108671	0.0067358
136	0.0073963	0.0085512
137	-0.0016327	0.0102251
138	-0.0213374	0.0111138

LOADING - THREE

R=0.66

RESULTANT JOINT DISPLACEMENTS - SUPPORTS

X DISP.

Y DISP.

Z DISP.

1	0.0	-0.1030825
2	0.0	-0.1022472
3	0.0	-0.1006755
4	0.0	-0.0980720
5	0.0	-0.0947222
6	0.0	-0.0921420
7	0.0	-0.0887511
8	0.0	-0.0829816
72	0.0188581	0.0
81	0.0202427	0.0
94	0.0221170	0.0
102	0.0230047	0.0
106	0.0232506	0.0
111	0.0231492	0.0
115	0.0229387	0.0
123	0.0224949	0.0
127	0.0218697	0.0
131	0.0213101	0.0

RESULTANT JOINT DISPLACEMENTS - FREE JOINTS

JOINT

/-----DISPLACEMENT-----/

X DISP.

Y DISP.

Z DISP.

9	0.0029493	-0.1027629
10	0.0024341	-0.1017208
11	0.0018854	-0.1004184
12	0.0004487	-0.0944473
13	0.0057705	-0.1014602
14	0.0047910	-0.1005676
15	0.0084707	-0.0997226
16	0.0070205	-0.0986357
17	0.0053045	-0.0972638
18	0.0028570	-0.0944844
19	0.0000346	-0.0884972
20	0.0109737	-0.0970650
21	0.0091034	-0.0960956
22	0.0132960	-0.0940173
23	0.0109664	-0.0928414
24	0.0082077	-0.0913330
25	0.0020254	-0.0862467
26	0.0153657	-0.0900692
27	0.0125951	-0.0890107
28	0.0172144	-0.0856597
29	0.0139590	-0.0844334
30	0.0105342	-0.0830733
31	0.0061620	-0.0809619
32	0.0004418	-0.0776742
33	-0.0047225	-0.0751926
34	-0.0101439	-0.0734153
35	-0.0185568	-0.0706841
36	0.0186957	-0.0790892
37	0.0148182	-0.0785391
38	0.0191172	-0.0724617
39	0.0157569	-0.0725477
40	0.0121557	-0.0723079
41	0.0048007	-0.0705772
42	0.0191742	-0.0678183
43	0.0162017	-0.0677749

44	0.0107196	-0.0671114
45	0.0074092	-0.0661054
46	0.0062237	-0.0635254
47	0.0014758	-0.0625141
48	0.0190406	-0.0635874
49	0.0163652	-0.0635846
50	0.0129853	-0.0632602
51	0.0096548	-0.0621725
52	0.0082636	-0.0612895
53	0.0048980	-0.0599093
54	-0.0025834	-0.0585479
55	0.0075594	-0.0583681
56	0.0034469	-0.0569537
57	0.0189343	-0.0601176
58	0.0163465	-0.0601341
59	0.0131772	-0.0603136
60	0.0110305	-0.0602210
61	0.0088481	-0.0571992
62	-0.0065358	-0.0530123
63	0.0063384	-0.0524392
64	0.0020511	-0.0514541
65	0.0093469	-0.0529612
66	0.0102455	-0.0443453
67	0.0053842	-0.0446598
68	-0.0021930	-0.0463983
69	0.0129518	-0.0337880
70	0.0079788	-0.0357570
71	0.0032407	-0.0388199
73	0.0188042	-0.0045525
74	0.0182811	-0.0092099
75	0.0177749	-0.0140982
76	0.0155959	-0.0261866
77	-0.0164591	-0.0431458
78	-0.0282611	-0.0419675
79	0.0123680	-0.0270016
80	0.0062914	-0.0315790
82	0.0199933	-0.0041555
83	0.0197100	-0.0083652
84	0.0181829	-0.0170567
85	0.0159995	-0.0210778
86	0.0085410	-0.0278820
87	-0.0005682	-0.0339908
88	-0.0056678	-0.0361774
89	0.0130251	-0.0217569
90	0.0055556	-0.0270922
91	0.0211943	-0.0036035
92	0.0200256	-0.0108625
93	0.0165737	-0.0170316
95	0.0215406	-0.0060532
96	0.0141235	-0.0162977
97	0.0224922	-0.0025207
98	0.0193221	-0.0092967
99	0.0081731	-0.0170615
100	-0.0039338	-0.0226715
101	-0.0293777	-0.0255754
103	0.0221768	-0.0039972
104	0.0149277	-0.0108808
105	0.0229509	-0.0015898
107	0.0222222	-0.0023504
108	0.0198137	-0.0046551
109	0.0101287	-0.0091495
110	0.0230002	-0.0008236
112	0.0224130	-0.0011145
113	0.0157516	-0.0033288
114	0.0228535	-0.0002901
116	0.0219840	0.0000625

117	0.0196676	0.0001193
118	0.0103220	0.0000401
119	-0.0016858	-0.0002034
120	-0.0147980	-0.0009330
121	-0.0283250	-0.0012441
122	0.0225301	0.0003585
124	0.0217625	0.0012770
125	0.0154711	0.0035471
126	0.0220049	0.0009390
128	0.0209359	0.0026074
129	0.0186725	0.0049097
130	0.0102521	0.0087534
132	0.0211797	0.0017134
133	0.0205486	0.0033641
134	0.0182062	0.0062760
135	0.0145564	0.0088189
136	0.0099854	0.0111883
137	-0.0018889	0.0133561
138	-0.0277954	0.0144970

LOADING - FOUR

R=0.83

RESULTANT JOINT DISPLACEMENTS - SUPPORTS

JOINT	DISPLACEMENT		
	X DISP.	Y DISP.	Z DISP.
1	0.0	-0.1206126	
2	0.0	-0.1198094	
3	0.0	-0.1183131	
4	0.0	-0.1158616	
5	0.0	-0.1126758	
6	0.0	-0.1102142	
7	0.0	-0.1070085	
8	0.0	-0.1004910	
72	0.0237562	0.0	
81	0.0254802	0.0	
94	0.0278095	0.0	
102	0.0289069	0.0	
106	0.0292063	0.0	
111	0.0290778	0.0	
115	0.0288176	0.0	
123	0.0282718	0.0	
127	0.0275043	0.0	
131	0.0268158	0.0	

RESULTANT JOINT DISPLACEMENTS - FREE JOINTS

JOINT	DISPLACEMENT		
	X DISP.	Y DISP.	Z DISP.
9	0.0031106	-0.1203024	
10	0.0026188	-0.1193022	
11	0.0021093	-0.1180554	
12	0.0006982	-0.1124172	
13	0.0060840	-0.1190470	
14	0.0051582	-0.1181826	
15	0.0089196	-0.1173815	
16	0.0075646	-0.1163381	

18	0.0036715	-0.1123587
19	0.0006068	-0.1065272
20	0.0115231	-0.1148879
21	0.0098237	-0.1129284
22	0.0139056	-0.1120843
23	0.0118464	-0.1109487
24	0.0094324	-0.1094378
25	0.0032348	-0.1042223
26	0.0160189	-0.1086547
27	0.0136519	-0.1075939
28	0.0179351	-0.1049272
29	0.0152045	-0.1037024
30	0.0121053	-0.1021562
31	0.0080044	-0.0992308
32	0.0013171	-0.0948226
33	-0.0051948	-0.0916559
34	-0.0118782	-0.0895265
35	-0.0220450	-0.0862257
36	0.0194553	-0.1003339
37	0.0164270	-0.0991260
38	0.0205508	-0.0954259
39	0.0171767	-0.0940452
40	0.0137035	-0.0922835
41	0.0064832	-0.0874970
42	0.0212454	-0.0889650
43	0.0173718	-0.0882561
44	0.0120812	-0.0856237
45	0.0092547	-0.0831172
46	0.0080098	-0.0795674
47	0.0022862	-0.0775630
48	0.0210519	-0.0825827
49	0.0177281	-0.0825203
50	0.0139268	-0.0819908
51	0.0112427	-0.0792153
52	0.0101297	-0.0775126
53	0.0063689	-0.0749122
54	-0.0026348	-0.0723736
55	0.0095533	-0.0734378
56	0.0045579	-0.0710635
57	0.0209233	-0.0782443
58	0.0176943	-0.0782643
59	0.0141250	-0.0783524
60	0.0120172	-0.0778806
61	0.0107557	-0.0726472
62	-0.0075371	-0.0654454
63	0.0079992	-0.0657695
64	0.0028206	-0.0641607
65	0.0116560	-0.0667241
66	0.0128801	-0.0555369
67	0.0068258	-0.0558248
68	-0.0023218	-0.0575572
69	0.0163565	-0.0421689
70	0.0100837	-0.0446179
71	0.0042407	-0.0483627
73	0.0236897	-0.0056690
74	0.0230386	-0.0114700
75	0.0224097	-0.0175613
76	0.0196879	-0.0326457
77	-0.0197145	-0.0532947
78	-0.0340217	-0.0517729
79	0.0156262	-0.0336299
80	0.0080361	-0.0398283
82	0.0251697	-0.0051736
83	0.0248186	-0.0104151
84	0.0229160	-0.0212386

87	0.0108523	-0.0347023
88	-0.0003544	-0.0422189
89	-0.0065412	-0.0448357
90	0.0164551	-0.0270646
91	0.0071625	-0.0336839
92	0.0266638	-0.0044843
93	0.0252095	-0.0135161
95	0.0208975	-0.0211831
96	0.0270923	-0.0075288
97	0.0178399	-0.0202573
98	0.0282730	-0.0031338
99	0.0243233	-0.0115527
100	0.0104653	-0.0212064
101	-0.0044284	-0.0281572
103	-0.0355549	-0.0317081
104	0.0278757	-0.0049670
105	0.0188573	-0.0135249
107	0.0288362	-0.0019759
108	0.0279291	-0.0029245
109	0.0249364	-0.0057924
110	0.0129291	-0.0113996
112	0.0288936	-0.0010268
113	0.0281641	-0.0013952
114	0.0199086	-0.0041720
116	0.0287111	-0.0003676
117	0.0276352	0.0000582
118	0.0247650	0.0001091
119	0.0132089	-0.0000316
120	-0.0015937	-0.0003760
121	-0.0177277	-0.0013112
122	-0.0343669	-0.0016841
124	0.0283131	0.0004332
125	0.0273645	0.0015579
126	0.0195807	0.0043193
128	0.0276680	0.0011499
129	0.0263487	0.0032004
130	0.0235474	0.0060226
132	0.0131432	0.0107197
133	0.0266543	0.0021067
134	0.0258733	0.0041362
135	0.0229751	0.0077109
136	0.0184630	0.0108254
137	0.0128182	0.0137231
138	-0.0018206	0.0163499
	-0.0337336	0.0177171

LOADING - FIVE

R=1.0

RESULTANT JCINT DISPLACEMENTS - SUPPORTS

JCINT	DISPLACEMENT		
	X DISP.	Y DISP.	Z DISP.
1	0.0		
2	0.0	-0.1361623	
3	0.0	-0.1353605	
4	0.0	-0.1339058	
5	0.0	-0.1315984	
6	0.0	-0.1286461	
7	0.0	-0.1264299	
8	0.0	-0.1236860	
		-0.1167514	

72	0.0291098	0.0
81	0.0311732	0.0
94	0.0339554	0.0
102	0.0352572	0.0
106	0.0356028	0.0
111	0.0354419	0.0
115	0.0351284	0.0
123	0.0344795	0.0
127	0.0335705	0.0
131	0.0327542	0.0

245

RESULTANT JOINT DISPLACEMENTS - FREE JOINTS

JOINT /-----DISPLACEMENT-----/

X DISP.

Y DISP.

Z DISP.

9	0.0031175	-0.1358535
10	0.0026434	-0.1348599
11	0.0021837	-0.1336191
12	0.0009234	-0.1283832
13	0.0060821	-0.1346282
14	0.0051972	-0.1337583
15	0.0088908	-0.1330135
16	0.0076043	-0.1319761
17	0.0061927	-0.1306701
18	0.0042371	-0.1281102
19	0.0013188	-0.1228356
20	0.0114071	-0.1305931
21	0.0098359	-0.1296018
22	0.0136236	-0.1279249
23	0.0117681	-0.1267756
24	0.0097680	-0.1252174
25	0.0044985	-0.1203774
26	0.0154596	-0.1248085
27	0.0134323	-0.1236677
28	0.0169824	-0.1215059
29	0.0147843	-0.1202646
30	0.0124918	-0.1186211
31	0.0096667	-0.1155466
32	0.0026604	-0.1109441
33	-0.0052449	-0.1071942
34	-0.0131795	-0.1047851
35	-0.0249740	-0.1009749
36	0.0179192	-0.1178100
37	0.0157872	-0.1164249
38	0.0182654	-0.1142333
39	0.0162009	-0.1127592
40	0.0143279	-0.1105272
41	0.0088652	-0.1039273
42	0.0130062	-0.1111383
43	0.0161714	-0.1095176
44	0.0136187	-0.1043918
45	0.0117672	-0.1003605
46	0.0104805	-0.0958327
47	0.0036489	-0.0924369
48	0.0173771	-0.1082509
49	0.0156972	-0.1065831
50	0.0138514	-0.1039626
51	0.0134567	-0.0977237
52	0.0126730	-0.0946515
53	0.0084439	-0.0901305
54	-0.0021608	-0.0859575
55	0.0121596	-0.0890946

9

56	0.0061785	-0.0852776
57	0.0166007	-0.1060964
58	0.0149949	-0.1044478
59	0.0132727	-0.1021155
60	0.0126459	-0.0993122
61	0.0133335	-0.0852580
62	-0.0080643	-0.0776229
63	0.0101211	-0.0754264
64	0.0040499	-0.0769482
65	0.0145055	-0.0810372
66	0.0159938	-0.0669240
67	0.0086868	-0.0671262
68	-0.0020058	-0.0686204
69	0.0202447	-0.0506123
70	0.0126226	-0.0535321
71	0.0056533	-0.0579228
73	0.0290310	-0.0067860
74	0.0282540	-0.0137320
75	0.0275062	-0.0210296
76	0.0242565	-0.0391339
77	-0.0224526	-0.0632498
78	-0.0391175	-0.0613659
79	0.0193455	-0.0402696
80	0.0102026	-0.0476814
82	0.0308020	-0.0061926
83	0.0303854	-0.0124672
84	0.0281166	-0.0254281
85	0.0248348	-0.0314141
86	0.0135962	-0.0415140
87	0.0002818	-0.0503886
88	-0.0069613	-0.0533895
89	0.0203347	-0.0323613
90	0.0091888	-0.0402440
91	0.0325887	-0.0053650
92	0.0308539	-0.0161696
93	0.0256790	-0.0253263
95	0.0330998	-0.0090019
96	0.0219987	-0.0241940
97	0.0345051	-0.0037450
98	0.0297736	-0.0137948
99	0.0131827	-0.0253168
100	-0.0044806	-0.0335885
101	-0.0411164	-0.0377666
103	0.0340218	-0.0059305
104	0.0232232	-0.0161448
105	0.0351659	-0.0023586
107	0.0340763	-0.0034923
108	0.0304966	-0.0069171
109	0.0161598	-0.0136270
110	0.0352248	-0.0012276
112	0.0343500	-0.0016724
113	0.0244986	-0.0050056
114	0.0350020	-0.0004440
116	0.0337186	0.0000542
117	0.0302940	0.0000990
118	0.0165359	-0.0001077
119	-0.0010342	-0.0005610
120	-0.0201372	-0.0017103
121	-0.0398278	-0.0021399
122	0.0345272	0.0005072
124	0.0333974	0.0018358
125	0.0241254	0.0050799
126	0.0337622	0.0013585
128	0.0321938	0.0037870
129	0.0288557	0.0071224
130	0.0164788	0.0126565

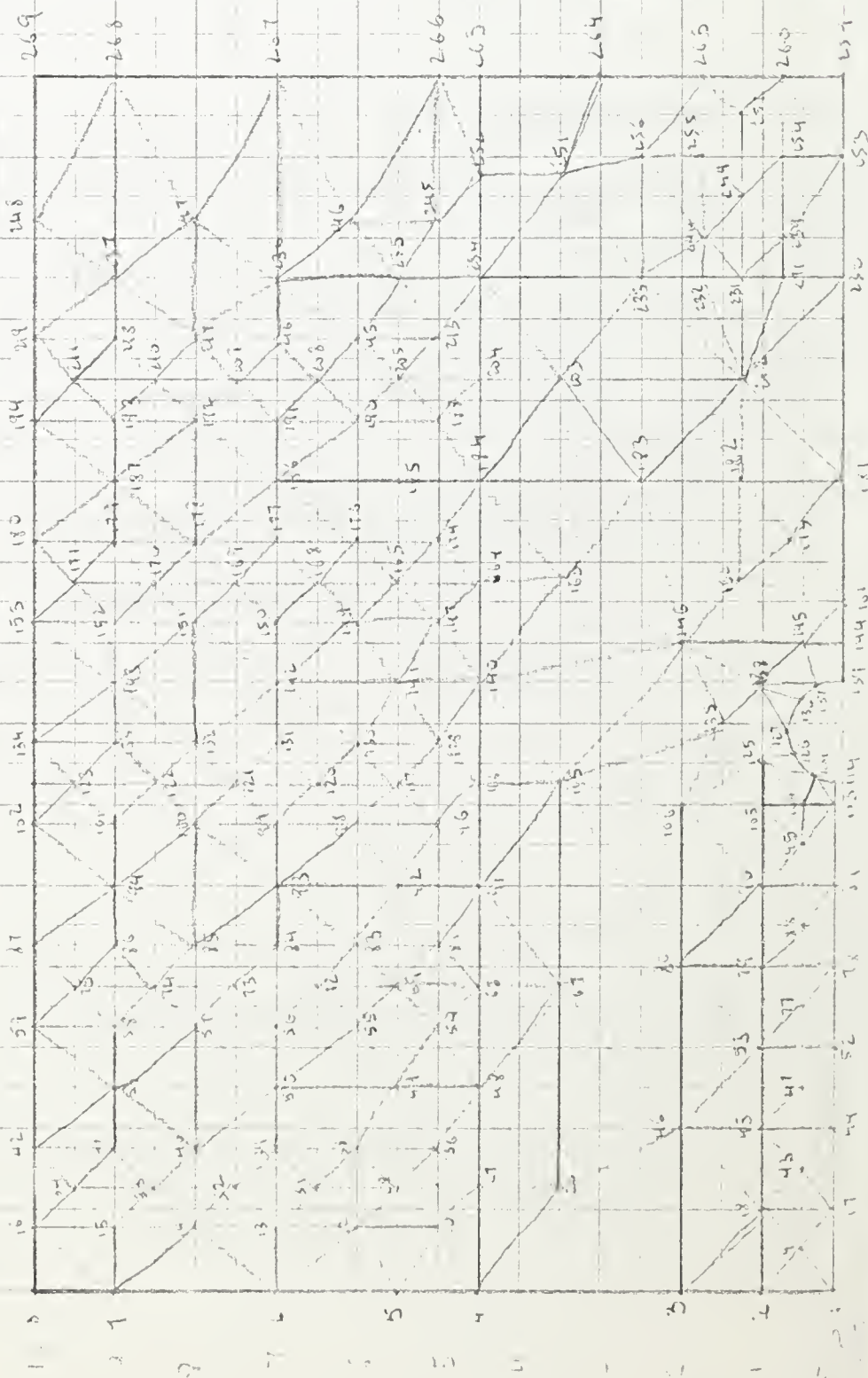
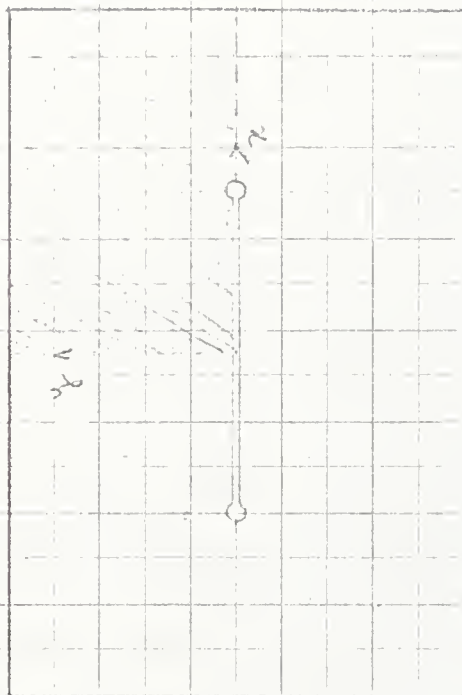
133	0.0316313	0.0049011
134	0.0281788	0.0091306
135	0.0228085	0.0128071
136	0.0160971	0.0162224
137	-0.0012760	0.0192885
138	-0.0391003	0.0208643

APPENDIX 7A

Lehigh specimen, no cut , 'CSTG' type .

The following presents :

- 1- Plate division , numbers are node names , page 249 .
- 2- Input data , pp 250 - 267 .
- 3- Output data , pp 268 - 271 .



APPENDIX 7A - ILEHIGH SPECIMEN, NO CUTS

TYPE PLANE STRESS

UNITS: CENTIMETERS

UNITS: KILOGRAMS

JOINT COORDINATES

1	0.00	0.10	5
2	0.00	1.00	5
3	0.00	2.00	5
4	0.00	4.50	5
5	0.00	5.50	5
6	0.00	7.00	5
7	0.00	8.00	5
8	0.00	10.00	5
9	0.50	0.50	
10	0.70	5.00	
11	0.70	6.00	
12	0.70	7.00	
13	0.70	8.00	
14	0.70	9.00	
15	0.70	0.00	
16	0.70	10.00	
17	1.00	0.10	
18	1.00	1.00	
26	1.25	2.50	

27 1.25 4.50

28 1.25 5.50

31 1.25 6.50

32 1.25 7.50

33 1.25 8.50

34 1.25 9.50

43 1.50 0.50

36 1.80 5.00

38 1.80 6.00

39 1.80 7.00

40 1.80 8.00

41 1.80 9.00

42 1.80 10.00

44 2.00 0.10

45 2.00 1.00

46 2.00 2.00

47 2.50 0.50

48 2.50 4.50

49 2.50 5.50

50 2.50 7.00

51 2.50 9.00

52 3.00 0.10

53 3.00 1.00

54 3.20 5.00

55 3.20 6.00

56 3.20 7.00

57 3.20 8.00

58 3.20 9.00

59 3.20 10.00

77 3.50 0.50

67 3.75 3.50

68 3.75 4.50

69 3.75 5.50

251
157

72	3.75	6.50
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73	3.75	7.50
----	------	------

74	3.75	8.50
----	------	------

75	3.75	9.50
----	------	------

78	4.00	0.10
----	------	------

79	4.00	1.00
----	------	------

80	4.00	2.00
----	------	------

81	4.30	5.00
----	------	------

82	4.30	6.00
----	------	------

84	4.30	7.00
----	------	------

85	4.30	8.00
----	------	------

86	4.30	9.00
----	------	------

87	4.30	10.00
----	------	-------

88	4.50	0.50
----	------	------

89	5.00	0.10
----	------	------

90	5.00	1.00
----	------	------

91	5.00	4.50
----	------	------

92	5.00	5.50
----	------	------

93	5.00	7.00
----	------	------

94	5.00	9.00
----	------	------

95	5.50	0.50
----	------	------

96	5.70	5.00
----	------	------

98	5.70	6.00
----	------	------

99	5.70	7.00
----	------	------

100	5.70	8.00
-----	------	------

101	5.70	9.00
-----	------	------

102	5.70	10.00
-----	------	-------

103	6.00	0.10
-----	------	------

104	6.00	0.50
-----	------	------

105	6.00	1.00
-----	------	------

106	6.00	2.00
-----	------	------

115	6.25	3.50
-----	------	------

116	6.25	4.50
-----	------	------

117 6.25 5.50

120 6.25 6.50

121 6.25 7.50

122 6.25 8.50

123 6.25 9.50

114 6.26 0.10

124 6.354 0.35

125 6.50 1.00

276 6.60 0.56

128 6.80 5.00

130 6.80 6.00

131 6.80 7.00

132 6.80 8.00

133 6.80 9.00

134 6.80 10.00

127 6.875 0.625

135 7.00 1.50

136 7.20 0.535

138 7.40 1.00

137 7.425 0.30

139 7.50 0.00 S

140 7.50 4.50

141 7.50 5.50

142 7.50 7.00

143 7.50 9.00

144 8.00 0.00 S

145 8.00 0.50

146 8.00 2.00

147 8.20 5.00

149 8.20 6.00

150 8.20 7.00

151 8.20 8.00

152 8.20 9.00

153 8.20 10.00

161 8.50 0.00 S

162 8.75 1.25

162 8.75 2.50

164 8.75 4.50

165 8.75 5.50

168 8.75 6.50

169 8.75 7.50

170 8.75 8.50

171 8.75 9.50

173 9.30 0.70

174 9.30 5.00

176 9.30 6.00

177 9.30 7.00

178 9.30 8.00

179 9.30 9.00

180 9.30 10.00

181 10.00 0.00 S

182 10.00 1.25

183 10.00 2.50

184 10.00 4.50

185 10.00 5.50

186 10.00 7.00

187 10.00 9.00

188 10.70 5.00

190 10.70 6.00

191 10.70 7.00

192 10.70 8.00

193 10.70 9.00

194 10.70 10.00

202 11.25 1.25

203 11.25 3.50

204 11.25 4.50

205 11.25 5.50

208 11.25 6.50

209 11.25 7.50

210 11.25 8.50

211 11.25 9.50

213 11.80 5.00

215 11.80 6.00

216 11.80 7.00

217 11.80 8.00

218 11.80 9.00

219 11.80 10.00

230 12.50 0.00 S

271 12.50 0.70

231 12.50 1.25

232 12.50 1.80

233 12.50 2.50

234 12.50 4.50

235 12.50 5.50

236 12.50 7.00

237 12.50 9.00

239 13.00 0.70

244 13.00 1.80

245 13.20 5.00

246 13.20 6.00

247 13.20 8.00

248 13.20 10.00

249 13.50 1.25

251 13.80 3.50

252 13.80 4.50

253 14.00 0.00 S

254 14.00 0.70

255 14.00 1.80

256 14.00 2.50

257 14.50 1.25

259 15.00 0.00 S

260 15.00 0.70

263 15.00 1.80

264 15.00 3.00

265 15.00 4.50

266 15.00 5.00

267 15.00 7.00

268 15.00 9.00

269 15.00 10.00

\$ BEFORE SAWCLT

ELEMENT INCIDENCES

1 1 17 9

2 2 1 9

3 2 9 18

4 9 17 18

5 17 44 43

6 18 17 43

7 18 43 45

8 43 44 45

9 44 52 47

10 45 44 47

11 45 47 53

12 47 52 53

13 52 78 77

14 53 52 77

15 53 77 79

16 77 78 79

17 78 89 88

18 79 78 88

19 79 88 90

20 88 89 90

21 95 89 102

22 90 89 95

23 90 95 105

24 95 104 105

25 95 103 104

26 103 114 124

27 104 103 124

28 105 104 125

29 104 124 125

30 125 124 276

31 125 276 127

32 125 127 135

33 135 127 138

34 127 136 138

35 136 137 138

36 138 127 145

37 137 139 145

38 139 144 145

39 3 2 18

40 3 18 46

41 18 45 46

42 46 45 53

43 46 53 80

44 53 79 80

45 80 79 90

46 80 90 106

47 90 105 106

48 106 105 125

49 106 125 135

50 135 138 146

51 138 145 146

52 146 145 162

53 145 161 162

54 145 144 161

55 162 161 173

56 173 161 181

57 162 173 182

58 173 181 182

59 182 181 202

60 202 181 230

61 202 230 271

62 271 230 239

63 239 230 253

64 239 253 254

65 254 253 260

66 253 259 260

67 202 271 231

68 231 271 239

69 231 239 249

71 249 254 257

72 254 260 257

73 257 260 263

74 249 239 254

82 244 249 255

83 255 249 257

84 255 257 263

86 232 231 244

87 244 231 249

88 202 231 232

89 202 232 233

90 233 232 244

91 233 244 256

92 244 255 256

93 256 255 263

94 256 263 264

95 4 3 26

96 3 46 26

97	26	46	67
98	46	80	67
99	67	80	115
100	80	106	115
101	106	135	115
102	115	135	146
103	115	146	140
104	140	146	163
105	163	146	183
106	146	162	183
107	162	182	183
108	183	182	202
109	183	202	203
110	163	183	184
111	184	183	203
112	203	202	233
113	203	233	234
114	234	233	251
115	233	256	251
116	251	256	264
117	251	264	265
118	4	26	27
119	27	26	48
120	48	26	67
121	48	67	68
122	68	67	91
123	91	67	115
124	91	115	116
125	116	115	140
126	140	163	164
127	164	163	184
128	184	203	204
129	204	203	234

120 234 251 252

131 252 251 265

132 5 4 10

133 5 10 12

134 4 27 10

135 12 10 28

136 10 27 28

137 28 27 36

138 28 36 38

139 27 48 36

140 38 36 49

141 36 48 49

142 49 48 54

143 49 54 55

144 48 68 54

145 55 54 69

146 54 68 69

147 69 68 81

148 69 81 83

149 83 81 92

150 81 68 91

151 81 91 92

152 92 91 96

153 92 96 98

154 96 91 116

155 98 96 117

156 96 116 117

157 117 116 128

158 117 128 130

159 130 128 141

160 128 140 141

161 128 116 140

162 141 140 147

163 141 147 149

164 149 147 165

165 147 164 165

166 165 164 174

167 165 174 176

168 176 174 185

169 174 184 185

170 185 184 188

171 185 188 190

172 190 188 205

173 188 204 205

174 147 140 164

175 174 164 184

176 188 184 204

177 205 204 213

178 213 204 234

179 213 234 235

180 205 213 215

181 215 213 235

182 235 234 245

183 245 234 252

184 245 252 266

185 235 245 246

186 246 245 266

187 246 266 267

189 6 5 12

190 6 12 13

191 13 12 31

192 13 31 32

193 6 13 14

194 14 13 32

195 7 6 14

196 14 32 33

197	7	14	15
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198	15	14	23
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199	15	33	34
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200	8	7	16
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201	7	15	16
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202	16	15	34
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203	16	34	42
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205	34	41	42
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206	34	33	41
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207	33	40	41
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208	33	32	40
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209	32	39	40
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210	22	31	39
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211	31	38	39
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213	38	49	50
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214	50	49	55
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216	39	38	50
-----	----	----	----

217	50	55	56
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218	40	39	50
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219	40	50	57
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220	50	56	57
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221	41	40	51
-----	----	----	----

222	51	40	57
-----	----	----	----

223	51	57	58
-----	----	----	----

224	42	41	51
-----	----	----	----

225	42	51	59
-----	----	----	----

226	51	58	59
-----	----	----	----

227	59	75	87
-----	----	----	----

228	59	58	75
-----	----	----	----

229	58	74	75
-----	----	----	----

230	58	57	74
-----	----	----	----

231	57	73	74
-----	----	----	----

232	57	56	73
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233 56 72 73

234 56 55 72

236 75 86 87

237 75 74 86

238 74 85 86

239 74 73 85

240 73 84 85

241 73 72 84

242 72 83 84

243 87 94 102

244 87 86 94

245 86 85 94

246 94 85 100

247 94 101 102

248 94 100 101

249 85 93 100

250 85 84 93

251 84 83 93

252 83 92 93

253 93 92 98

254 93 98 99

255 93 99 100

256 102 123 134

257 102 101 123

258 101 122 123

259 101 100 122

260 100 121 122

261 100 99 121

262 99 120 121

263 99 98 120

265 123 133 134

266 123 122 133

267 122 132 133

268 122 121 132

269 121 131 132

270 121 120 131

271 120 130 131

272 134 143 153

273 134 133 143

274 133 132 143

275 143 132 151

276 143 152 153

277 143 151 152

278 132 142 151

279 132 131 142

280 142 150 151

281 131 130 142

282 130 141 142

285 142 141 149

286 142 149 150

287 153 171 180

288 153 152 171

289 152 170 171

290 152 151 170

291 151 169 170

292 151 150 169

293 150 168 169

294 150 149 168

296 171 179 180

297 171 170 179

298 170 178 179

299 170 169 178

300 169 177 178

301 169 168 177

302 168 176 177

303 180 187 194

304 180 179 187

305 179 178 187

306 187 178 192

307 187 192 193

308 187 193 194

309 178 177 186

310 178 186 192

311 186 191 192

312 177 176 186

313 176 185 186

314 186 185 190

315 186 190 191

318 194 211 219

319 194 193 211

320 193 210 211

321 193 192 210

322 192 209 210

323 192 191 209

324 191 208 209

325 191 190 208

327 211 218 219

328 211 210 218

329 210 217 218

330 210 209 217

331 209 216 217

332 209 208 216

333 208 215 216

334 219 218 237

335 218 217 237

336 237 217 247

337 217 236 247

338 217 216 236

339 216 215 236

340 215 235 236

266

342 236 235 246

343 219 237 248

344 248 237 268

345 248 268 269

346 237 247 268

347 247 267 268

348 247 236 267

349 236 246 267

351 12 28 31

359 31 28 38

363 55 69 72

372 72 69 83

375 98 117 120

382 120 117 130

386 149 165 168

394 168 165 176

398 190 205 208

408 208 205 215

410 252 265 266

ELEMENT PROPERTIES

1 TO 69 71 TO 74 82 TO 84 86 TO 187 189 TO 203 205 TO 211 213 214 -
216 TO 234 236 TO 263 265 TO 282 285 TO 294 296 TO 315 318 TO 325 -
327 TO 340 342 TO 349 351 359 363 372 375 382 386 394 398 408 410
TYPE 'CSTE' THICKNESS 1.00

CONSTANTS

E 21100.0 ALL

PCISSCN 0.30 ALL

JOINT RELEASES

1 TO 8 FORCE Y

129 144 161 181 230 253 259 FORCE X

\$ FORCE APPLIED = 10000 KG/CM , SIGMAC = 10000 KG/CM**2

LOADING 'CNE' 'UNIFORM'

JOINT LOADS

1 FORCE Y -50.0

267

17 44 52 78 85 FORCE Y -100.0

103 FORCE Y -63.0

114 FORCE Y -13.0

STIFFNESS ANALYSIS

LIST DISPLACEMENTS STRESSES ALL

5 611 10⁴/cm² 10⁴/cm²

LOADING - CNE

UNIFORM

RESULTANT JOINT DISPLACEMENTS - SUPPORTS

JOINT	DISPLACEMENT		
	X DISP.	Y DISP.	Z DISP.
1	0.0	-0.1238220	
2	0.0	-0.1218426	
3	C.C	-0.1198736	
4	0.0	-0.1114380	
5	0.0	-0.1084211	
6	C.C	-0.1049336	
7	0.0	-0.1011863	
8	C.C	-0.0987520	
139	0.0366592	C.C	
144	0.0349579	0.0	
161	0.0346456	0.0	
181	0.0308965	C.C	
230	0.0277734	0.0	
253	0.0265861	C.C	
259	0.0252243	0.0	

RESULTANT JOINT DISPLACEMENTS - FREE JOINTS

JOINT	DISPLACEMENT		
	X DISP.	Y DISP.	Z DISP.
9	0.0034677	-0.1224273	
10	-0.0008480	-0.1089891	
12	-0.0015844	-0.1064862	
13	-0.0022251	-0.1041831	
14	-0.0030214	-0.1024472	
15	-0.0040784	-0.1003999	
16	-0.0053064	-0.0985278	
17	C.C080562	-0.1222486	
18	0.0054886	-0.1201881	
26	C.C0007042	-0.1127369	
27	-0.0008552	-0.1091887	
28	-0.0021827	-0.1061444	
31	-0.0033312	-0.1038064	
32	-0.0045934	-0.1018527	
33	-0.0061834	-0.1000421	
34	-0.0083512	-0.0981742	
43	0.0102577	-0.1192955	
36	-0.0022488	-0.1047578	
38	-0.0038927	-0.1025499	
39	-0.0055753	-0.1004703	
40	-0.0075915	-0.0988882	
41	-0.0101703	-0.0969490	
42	-0.0139074	-0.0951923	
44	0.0158740	-0.1176267	
45	0.0107090	-0.1154786	
46	0.0060690	-0.1132578	

47	C.C167239	-0.1130995
48	-C.CC17527	-C.1C1548C
49	-0.0041317	-0.0993336
50	-0.0076023	-0.0965432
51	-C.C138674	-0.0933583
52	0.0233276	-0.1C99276
53	0.0154635	-0.1076428
54	-C.CC26363	-C.C949522
55	-0.0066111	-C.C931054
56	-C.CC94207	-0.0914378
57	-C.C128547	-C.C9C2C92
58	-0.0172425	-0.C886095
59	-0.C23C42C	-0.0872C28
77	0.0226940	-0.1C2729C
67	0.0014684	-0.0941615
68	-C.CC24632	-C.C913224
69	-0.0C59389	-C.C89C00C
72	-C.CC9C725	-0.C874845
73	-C.C125584	-C.C86243C
74	-0.0169637	-0.0850140
75	-0.0227807	-0.C836722
78	0.0303C49	-0.0989394
79	C.C1959CC	-C.C965939
8C	0.01C4625	-0.0943864
81	-C.CC48498	-0.0837878
82	-C.CC82944	-0.C826832
84	-0.0118528	-0.0816101
85	-C.C162517	-C.C8C7142
86	-0.0217738	-C.C795C29
87	-C.0292667	-0.C78281C
88	0.C279443	-C.C9C66C9
89	0.0363638	-0.0839827
9C	C.C2255C7	-0.0811545
91	-C.CC329C4	-C.C755954
92	-0.0070516	-0.0751445
93	-C.C131195	-0.07441C1
94	-0.0241772	-0.C729C55
95	C.C316955	-0.0732776
96	-C.CC51572	-C.C665C88
98	-0.0095259	-0.0666960
99	-C.C139786	-C.C665799
100	-0.0194281	-0.C6637C9
101	-0.026C812	-C.C657161
102	-C.C346643	-C.C65C392
103	0.0410111	-0.0643857
104	C.C33C721	-0.C63C053
105	C.C245932	-C.C6196C5
106	0.013C53C	-0.0612877
115	C.CC2C2C5	-C.C578C45
116	-0.0024606	-C.C588516
117	-C.CC729C8	-0.0597450
120	-0.C119737	-C.C6C2835
121	-0.0172397	-0.06C4C91
122	-0.02360C1	-C.C6C19C8
123	-0.0315188	-0.C596751
114	C.C4141C7	-C.C577816
124	0.0365982	-0.0543729
125	0.0248541	-C.C494762
276	C.C333514	-C.C46788C
128	-0.0045333	-0.0521484
13C	-C.CC95C84	-0.0534436
131	-C.C147789	-0.C54C862
132	-0.0209391	-0.0542958
133	-C.C282445	-C.C54C793
134	-0.0373C23	-C.C536C94
127	C.C314676	-0.037117C

135	0.0184765	-0.0371755
136	0.0320516	-0.0252254
138	0.0260633	-0.0230033
137	0.0337740	-0.0112459
140	-0.0010805	-0.0418336
141	-0.0063092	-0.0442750
142	-0.0149349	-0.0462993
143	-0.0290876	-0.0467349
145	0.0329733	-0.0065700
146	0.0174020	-0.0220235
147	-0.0024573	-0.0350088
149	-0.0085697	-0.0371735
150	-0.0147899	-0.0384785
151	-0.0217460	-0.0391730
152	-0.0295381	-0.0393774
153	-0.0387003	-0.0393311
162	0.0270436	-0.0090455
163	0.0094599	-0.0229701
164	0.0020187	-0.0269552
165	-0.0046726	-0.0302156
168	-0.0112231	-0.0321679
169	-0.0181092	-0.0332417
170	-0.0256557	-0.0337557
171	-0.0341280	-0.0338721
173	0.0302797	-0.0034253
174	-0.0002932	-0.0235263
176	-0.0072590	-0.0258891
177	-0.0143116	-0.0272593
178	-0.0217419	-0.0281596
179	-0.0298069	-0.0285229
180	-0.0385926	-0.0285797
182	0.0271078	-0.0038402
183	0.0191801	-0.0083371
184	0.0045573	-0.0158437
185	-0.0027900	-0.0185556
186	-0.0138485	-0.0210555
187	-0.0296817	-0.0221537
188	0.0018452	-0.0121170
190	-0.0057334	-0.0138280
191	-0.0134325	-0.0149734
192	-0.0213082	-0.0156187
193	-0.0294569	-0.0160045
194	-0.0379251	-0.0161597
202	0.0270474	-0.0013527
203	0.0137549	-0.0055587
204	0.0060875	-0.0074434
205	-0.0013668	-0.0090643
208	-0.0091765	-0.0102003
209	-0.0171058	-0.0109012
210	-0.0251722	-0.0113029
211	-0.0334156	-0.0115050
213	0.0028991	-0.0049109
215	-0.0048750	-0.0057979
216	-0.0128881	-0.0064156
217	-0.0209289	-0.0067959
218	-0.0291089	-0.0070057
219	-0.0371919	-0.0071382
271	0.0268472	0.0000773
231	0.0256017	0.0002420
232	0.0236225	0.0003587
233	0.0203275	0.0002186
234	0.0071054	-0.0004622
235	-0.0006211	-0.0008663
236	-0.0126121	-0.0013485
237	-0.0288799	-0.0015650
239	0.0266797	0.0006801

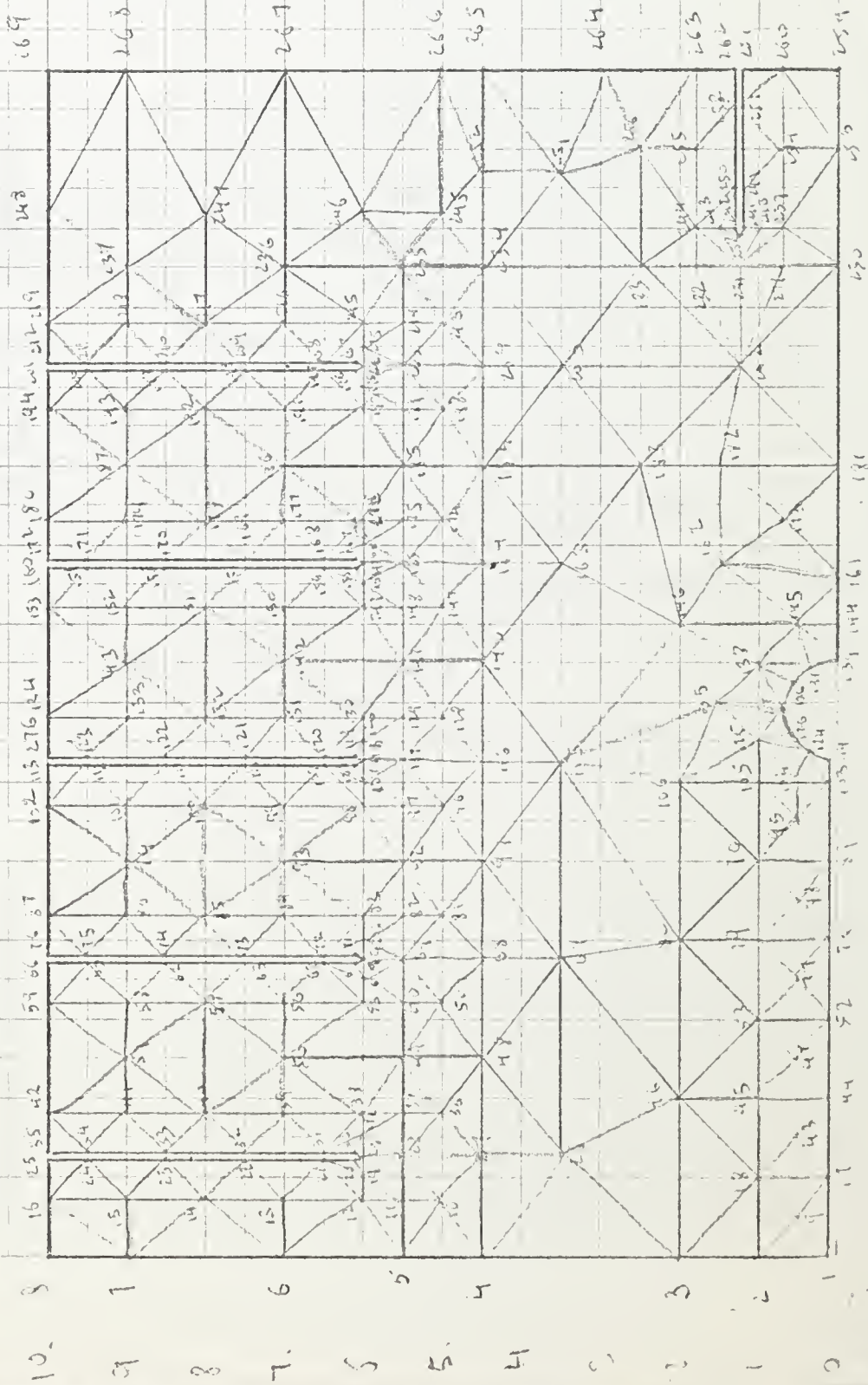
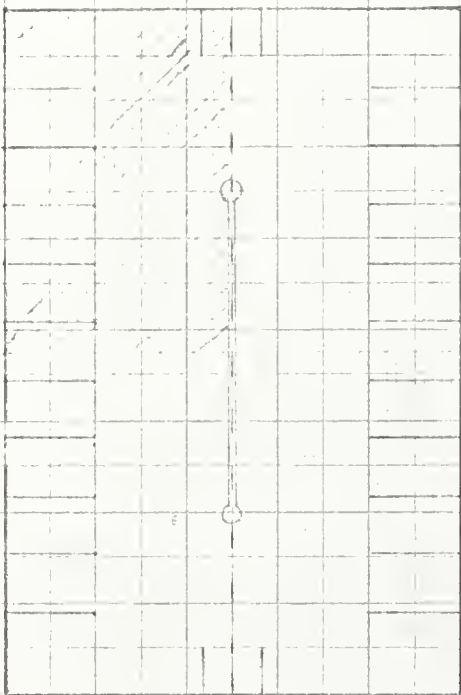
244	C.C235007	0.0014589
245	C.CC33280	C.CC33710
246	-0.0043960	0.0026597
247	-C.0206248	0.0038092
248	-C.C366467	0.0037632
249	0.0250225	0.0019406
251	C.C140344	C.CC58447
252	0.0069591	0.0067710
254	0.0257959	0.0016505
255	C.C227486	0.0040102
256	0.0197020	0.0053705
257	C.C242400	0.0039325
260	C.C249848	0.0027783
263	0.0220303	0.0072202
264	C.C163185	C.C111397
265	0.0066608	C.C144279
266	C.C030020	0.0151937
267	-C.C125602	C.C169812
268	-0.0286050	C.C175406
269	-C.C364414	0.0175417

APPENDIX 7B

Lehigh specimen with saw-cut , 'CSTG' type .

The following presents :

- 1- Plate division , numbers are node names , page 273 .
- 2- Input data , pp 274 - 295 .
- 3- Output data , pp 296 - 300 .



APPENDIX 7B ILEHIGH SPECIMEN, V=6 CM

TYPE PLANE STRESS

UNITS CENTIMETERS

UNITS KILOGRAMS

JOINT COORDINATES

1	0.00	0.10	5
2	0.00	1.00	5
3	0.00	2.00	5
4	0.00	4.50	5
5	0.00	5.50	5
6	0.00	7.00	5
7	0.00	8.00	5
8	0.00	10.00	5
9	0.50	0.50	
10	0.70	5.00	
11	0.70	5.50	
12	0.70	6.00	
13	0.70	7.00	
14	0.70	8.00	
15	0.70	8.00	
16	0.70	10.00	
17	1.00	0.10	
18	1.00	1.00	
19	1.00	6.00	
20	1.20	6.10	
21	1.20	6.50	
22	1.20	7.50	
23	1.20	8.50	
24	1.20	9.50	
25	1.20	10.00	
26	1.25	2.50	

19 1.00 6.00

20 1.20 6.10

21 1.20 6.50

22 1.20 7.50

23 1.20 8.50

24 1.20 9.50

25 1.20 10.00

26 1.25 3.50

27 1.25 4.50

28 1.25 5.50

29 1.25 6.00

30 1.30 6.10

31 1.30 6.50

32 1.30 7.50

33 1.30 8.50

34 1.30 9.50

35 1.30 10.00

43 1.50 0.50

272 1.50 6.00

36 1.80 5.00

37 1.80 5.50

38 1.80 6.00

39 1.80 7.00

40 1.80 8.00

41 1.80 9.00

42 1.80 10.00

44 2.00 0.10

45 2.00 1.00

46 2.00 2.00

47 2.50 0.50

48 2.50 4.50

49 2.50 5.50

50 2.50 7.00

51 2.50 9.00

52 3.00 0.10

53 3.00 1.00

54 3.20 5.00

270 3.20 5.50

55 3.20 6.00

56 3.20 7.00

57 3.20 8.00

58 3.20 9.00

59 3.20 10.00

60 3.50 6.00

77 3.50 0.50

61 3.70 6.10

62 3.70 6.50

63 3.70 7.50

64 3.70 8.50

65 3.70 9.50

66 3.70 10.00

67 3.75 3.50

68 3.75 4.50

69 3.75 5.50

70 3.75 6.00

71 3.80 6.10

72 3.80 6.50

73 3.80 7.50

74 3.80 8.50

75 3.80 9.50

76 3.80 10.00

78 4.00 0.10

79 4.00 1.00

80 4.00 2.00

273 4.00 6.00

81 4.30 5.00

82 4.30 5.50

83 4.30 6.00

84 4.30 7.00

85 4.30 8.00

86 4.30 9.00

87 4.30 10.00

88 4.50 0.50

89 5.00 0.10

90 5.00 1.00

91 5.00 4.50

92 5.00 5.50

93 5.00 7.00

94 5.00 9.00

95 5.50 0.50

96 5.70 5.00

97 5.70 5.50

98 5.70 6.00

99 5.70 7.00

100 5.70 8.00

101 5.70 9.00

102 5.70 10.00

103 6.00 0.10

104 6.00 0.50

105 6.00 1.00

106 6.00 2.00

107 6.00 6.00

108 6.20 6.10

109 6.20 6.50

110 6.20 7.50

111 6.20 8.50

112 6.20 9.50

113 6.20 10.00

115 6.25 3.50

116 6.25 4.50

117 6.25 5.50

118 6.25 6.00

114 6.26 0.10

119 6.30 6.10

120 6.30 6.50

121 6.30 7.50

122 6.30 8.50

123 6.30 9.50

277 6.30 10.00

124 6.354 0.35

125 6.50 1.00

126 6.50 6.00

276 6.60 0.56

128 6.80 5.00

129 6.80 5.50

130 6.80 6.00

131 6.80 7.00

132 6.80 8.00

133 6.80 9.00

134 6.80 10.00

127 6.875 0.625

135 7.00 1.50

136 7.20 0.535

138 7.40 1.00

137 7.425 0.30

139 7.50 0.00 S

140 7.50 4.50

141 7.50 5.50

142 7.50 7.00

143 7.50 9.00

144 8.00 0.00 S

145 8.00 0.50

146 8.00 2.00

147 8.20 5.00

148 8.20 5.50

149 8.20 6.00

150 8.20 7.00

151 8.20 8.00

152 8.20 9.00

153 8.20 10.00

161 8.50 0.00 S

154 8.50 6.00

155 8.70 6.10

156 8.70 6.50

157 8.70 7.50

158 8.70 8.50

159 8.70 9.50

160 8.70 10.00

162 8.75 1.25

163 8.75 3.50

164 8.75 4.50

165 8.75 5.50

166 8.75 6.00

167 8.80 6.10

168 8.80 6.50

169 8.80 7.50

170 8.80 8.50

171 8.80 9.50

172 8.80 10.00

274 9.00 6.00

173 9.30 0.70

174 9.30 5.00

175 9.30 5.50

176 9.30 6.00

177 9.30 7.00

178 9.30 8.00

179 9.30 9.00

180 9.30 10.00

181 10.00 0.00 S

182 10.00 1.25

183 10.00 2.50

184 10.00 4.50

185 10.00 5.50

186 10.00 7.00

187 10.00 9.00

188 10.70 5.00

189 10.70 5.50

190 10.70 6.00

191 10.70 7.00

192 10.70 8.00

193 10.70 9.00

194 10.70 10.00

195 11.00 6.00

196 11.20 6.10

197 11.20 6.50

198 11.20 7.50

199 11.20 8.50

200 11.20 9.50

201 11.20 10.00

202 11.25 1.25

203 11.25 3.50

204 11.25 4.50

205 11.25 5.50

206 11.25 6.00

207 11.30 6.10

208 11.30 6.50

209 11.30 7.50

210 11.30 8.50

211 11.30 9.50

212 11.30 10.00

275 11.50 6.00

213 11.80 5.00

214 11.80 5.50

215 11.80 6.00

216 11.80 7.00

217 11.80 8.00

218 11.80 9.00

219 11.80 10.00

230 12.50 0.00 S

271 12.50 0.70

231 12.50 1.25

232 12.50 1.80

233 12.50 2.50

234 12.50 4.50

235 12.50 5.50

236 12.50 7.00

237 12.50 9.00

238 12.875 1.25

240 12.975 1.00

241 12.975 1.20

242 12.975 1.30

243 12.975 1.50

239 13.00 0.70

244 13.00 1.80

245 13.20 5.00

246 13.20 6.00

247 13.20 8.00

248 13.20 10.00

249 13.50 1.20

250 13.50 1.30

251 13.80 3.50

252 13.80 4.50

253 14.00 0.00 S

254 14.00 0.70

255 14.00 1.80

256 14.00 2.50

257 14.50 1.20

258 14.50 1.30

259 15.00 0.00 S

260 15.00 0.70

261 15.00 1.20

262 15.00 1.30

263 15.00 1.80

264 15.00 3.00

265 15.00 4.50

266 15.00 5.00

267 15.00 7.00

268 15.00 9.00

269 15.00 10.00

ELEMENT INCIDENCES

1 1 17 9

2 2 1 9

3 2 9 18

4 9 17 18

5 17 44 43

6 18 17 43

7 18 43 45

8 43 44 45

9 44 52 47

10 45 44 47

11 45 47 53

12 47 52 53

13 52 78 77

14 53 52 77

15 53 77 79

16 77 78 79

17 78 89 88

18 79 78 88

19 79 88 90

20 88 89 90

21 95 89 103

22 90 89 95

23 90 95 105

24 95 104 105

25 95 103 104

26 103 114 124

27 104 103 124

28 105 104 125

29 104 124 125

30 125 124 276

31 125 276 127

32 125 127 135

33 135 127 138

34 127 136 138

35 136 137 138

36 138 137 145

37 137 139 145

38 139 144 145

39 3 2 18

40 3 18 46

41 18 45 46

42 46 45 53

43 46 53 80

44 53 79 80

45 80 79 90

46 80 90 106

47 90 105 106

48 106 105 125

284

49 106 125 135

50 135 138 146

51 138 145 146

52 146 145 162

53 145 161 162

54 145 144 161

55 162 161 173

56 173 161 181

57 162 173 182

58 173 181 182

59 182 181 202

60 202 181 230

61 202 230 271

62 271 230 239

63 239 230 253

64 239 253 254

65 254 253 260

66 253 259 260

67 202 271 231

68 231 271 240

69 231 240 238

70 238 240 241

71 241 240 249

72 240 239 249

73 271 239 240

74 249 239 254

75 249 254 257

76 257 254 260

77 257 260 261

78 231 238 243

79 238 242 243

80 243 242 250

81 244 243 250

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82 244 250 255

83 250 258 255

84 255 258 263

85 258 262 263

86 232 231 243

87 232 243 244

88 202 231 232

89 202 232 233

90 233 232 244

91 233 244 256

92 244 255 256

93 256 255 263

94 256 263 264

95 4 3 26

96 3 46 26

97 26 46 67

98 46 80 67

99 67 80 115

100 80 106 115

101 106 135 115

102 115 135 146

103 115 146 140

104 140 146 163

105 163 146 183

106 146 162 183

107 162 182 183

108 183 182 202

109 183 202 203

110 163 183 184

111 184 183 203

112 203 202 233

113 203 233 234

114 234 233 251

115 232 256 251

116 251 256 264

117 251 264 265

118 4 26 27

119 27 26 48

120 48 26 67

121 48 67 68

122 68 67 91

123 91 67 115

124 91 115 116

125 116 115 140

126 140 163 164

127 164 163 184

128 184 203 204

129 204 203 234

130 234 251 252

131 252 251 265

132 5 4 10

133 5 10 11

134 4 27 10

135 11 10 28

136 10 27 28

137 28 27 36

138 28 36 37

139 27 48 36

140 27 26 49

141 36 48 49

142 49 48 54

143 49 54 270

144 48 68 54

145 270 54 69

146 54 68 69

147 69 68 81

148 69 81 82

149 82 81 92

150 81 68 91

151 81 91 92

152 92 91 96

153 92 96 97

154 96 91 116

155 97 96 117

156 96 116 117

157 117 116 128

158 117 128 129

159 129 128 141

160 128 140 141

161 128 116 140

162 141 140 147

163 141 147 148

164 148 147 165

165 147 164 165

166 165 164 174

167 165 174 175

168 175 174 185

169 174 184 185

170 185 184 188

171 185 188 189

172 189 188 205

173 188 204 205

174 147 140 164

175 174 164 184

176 188 184 204

177 205 204 213

178 213 204 234

179 213 234 235

180 205 213 214

288

181 214 213 235

182 235 234 245

183 245 234 252

184 245 252 266

185 235 245 246

186 246 245 266

187 246 266 267

188 5 11 12

189 6 5 12

190 6 12 13

191 13 12 21

192 13 21 22

193 6 13 14

194 14 13 22

195 7 6 14

196 14 22 23

197 7 14 15

198 15 14 23

199 15 23 24

200 8 7 16

201 7 15 16

202 16 15 24

203 16 24 25

204 35 34 42

205 34 41 42

206 34 33 41

207 33 40 41

208 33 32 40

209 32 39 40

210 32 31 39

211 31 38 39

212 38 37 49

213 38 49 50

214 50 49 55

215 49 270 55

216 39 38 50

217 50 55 56

218 40 39 50

219 40 50 57

220 50 56 57

221 41 40 51

222 51 40 57

223 51 57 58

224 42 41 51

225 42 51 59

226 51 58 59

227 59 65 66

228 59 58 65

229 58 64 65

230 58 57 64

231 57 63 64

232 57 56 63

233 56 62 63

234 56 55 62

235 76 75 87

236 75 86 87

237 75 74 86

238 74 85 86

239 74 73 85

240 73 84 85

241 73 72 84

242 72 83 84

243 87 94 102

244 87 86 94

245 86 85 94

246 94 85 100

247 94 101 102

248 94 100 101

249 85 93 100

250 85 84 93

251 84 83 93

252 83 92 93

253 93 92 98

254 93 98 99

255 93 99 100

256 102 112 113

257 102 101 112

258 101 111 112

259 101 100 111

260 100 110 111

261 100 99 110

262 99 109 110

263 99 98 109

264 277 123 134

265 123 133 134

266 123 122 133

267 122 132 133

268 122 121 132

269 121 131 132

270 121 120 131

271 120 130 131

272 134 143 153

273 134 133 143

274 133 132 143

275 143 132 151

276 143 152 153

277 143 151 152

278 132 142 151

279 132 131 142

291

280 142 150 151

281 131 130 142

282 130 141 142

283 130 129 141

284 141 148 149

285 142 141 149

286 142 149 150

287 152 159 160

288 153 152 159

289 152 158 159

290 152 151 158

291 151 157 158

292 151 150 157

293 150 156 157

294 150 149 156

295 172 171 180

296 171 179 180

297 171 170 179

298 170 178 179

299 170 169 178

300 169 177 178

301 169 168 177

302 168 176 177

303 180 187 194

304 180 179 187

305 179 178 187

306 187 178 192

307 187 192 193

308 187 193 194

309 178 177 186

310 178 186 192

311 186 191 192

291

312 177 176 186

292

313 176 185 186

314 186 185 190

315 186 190 191

316 176 175 185

317 185 189 190

318 194 200 201

319 194 193 200

320 193 199 200

321 193 192 199

322 192 198 199

323 192 191 198

324 191 197 198

325 191 190 197

326 212 211 219

327 211 218 219

328 211 210 218

329 210 217 218

330 210 209 217

331 209 216 217

332 209 208 216

333 208 215 216

334 219 218 237

335 218 217 237

336 237 217 247

337 217 236 247

338 217 216 236

339 216 215 236

340 215 235 236

341 215 214 235

342 236 235 246

343 219 237 248

344 248 237 268

296

345 248 268 269

293

346 237 247 268

347 247 267 268

348 247 236 267

349 236 246 267

350 12 11 19

351 12 19 21

352 19 20 21

353 19 29 20

354 19 11 28

355 19 28 29

356 29 28 272

357 30 29 272

358 31 30 272

359 31 272 38

360 28 37 272

361 272 37 38

362 55 270 60

363 55 60 62

364 60 61 62

365 60 70 61

366 60 69 70

367 60 270 69

368 70 69 273

369 69 82 273

370 71 70 273

371 72 71 273

372 72 273 83

373 273 82 83

374 98 97 107

375 98 107 109

376 107 108 109

377 108 107 118

293

378 107 117 118

294

379 107 97 117

380 119 118 126

381 120 119 126

382 120 126 130

383 118 117 126

384 126 117 129

385 126 129 130

386 149 154 156

387 149 148 154

388 154 148 165

389 154 155 156

390 154 166 155

391 154 165 166

392 167 166 274

393 168 167 274

394 168 274 176

395 166 165 274

396 165 175 274

397 274 175 176

398 190 195 197

399 195 196 197

400 195 206 196

401 190 189 195

402 195 189 205

403 195 205 206

404 206 205 275

405 275 205 214

406 207 206 275

407 208 207 275

408 208 275 215

409 275 214 215

410 252 265 266

294

411 83 82 92

412 92 97 98

295

ELEMENT PROPERTIES

1 TO 412 TYPE 'CSTG' THICKNESS 1.00

CONSTANTS

E 21100.0 ALL

POISSON 0.30 ALL

JOINT RELEASES

1 TO 8 FORCE Y

139 144 161 181 230 253 259 FORCE X

\$ FORCE APPLIED = 10000 KG/CM , SIGMA0 = 10000 KG/CM**2

LOADING 'CNE' 'UNIFORM'

JOINT LOADS

1 FORCE Y -50.0

17 44 52 78 89 FORCE Y -100.0

103 FORCE Y -63.0

114 FORCE Y -13.0

STIFFNESS ANALYSIS

LIST DISPLACEMENTS STRESSES ALL

295

LOADING - CNF

UNIFORM

RESULTANT JOINT DISPLACEMENTS - SUPPORTS

JCINT	/-----DISPLACEMENT-----/		
	X DISP.	Y DISP.	Z DISP.
1	0.0	-0.2019319	
2	C.C	-0.2012517	
3	0.0	-0.2010719	
4	0.0	-0.1930984	
5	C.C	-0.1884045	
6	0.0	-0.1830611	
7	0.0	-0.1842340	
8	C.C	-0.1842605	
139	0.0490257	0.0	
144	0.0460593	0.0	
161	0.0451241	0.0	
181	0.0375391	0.0	
230	0.0301626	C.C	
253	0.0262622	0.0	
255	0.0266258	0.0	

RESULTANT JCINT DISPLACEMENTS - FREE JOINTS

JCINT	/-----DISPLACEMENT-----/		
	X DISP.	Y DISP.	Z DISP.
9	0.0056779	-0.2005199	
10	-0.0057007	-0.1896487	
11	-0.0067895	-0.1877328	
12	-0.0064182	-0.1853298	
13	-0.0013789	-0.1845239	
14	0.0001942	-0.1841567	
15	0.0000976	-0.1842617	
16	C.CCCC251	-0.1842826	
17	0.0135303	-0.1986922	
18	C.CC84880	-0.1977467	
19	-0.0102445	-0.1865546	
20	-0.0101109	-0.1868238	
21	-0.0046885	-0.1862653	
22	-0.0003315	-0.1852055	
23	C.CC02283	-0.1843486	
24	C.CC000567	-0.1842562	
25	0.0000261	-0.1842555	
26	-0.0022585	-0.1921741	
27	-0.0067840	-0.1884069	
28	-0.0121258	-0.1868350	
29	-0.0153171	-0.1866009	
30	-0.0218468	-0.1857866	
31	-0.0326195	-0.1849236	
32	-0.0509382	-0.1839907	
33	-0.0663199	-0.1832954	
34	-0.0810898	-0.1832286	

35	-0.0885186	-0.1822286
43	-0.0166177	-0.1941437
272	-0.0203764	-0.1824622
36	-0.0130250	-0.1804371
37	-0.0172322	-0.1788149
38	-0.0240743	-0.1766981
39	-0.0426586	-0.1759909
40	-0.0588265	-0.1756635
41	-0.0736672	-0.1757778
42	-0.0885186	-0.1757997
44	0.0263463	-0.1893974
45	0.0163414	-0.1882674
46	0.0075937	-0.1873911
47	0.0267295	-0.1817896
48	-0.0130062	-0.1718265
49	-0.0228615	-0.1685044
50	-0.0437280	-0.1643615
51	-0.0735842	-0.1653446
52	0.0380125	-0.1742924
53	0.0232693	-0.1727671
54	-0.0222485	-0.1589400
270	-0.0282875	-0.1574702
55	-0.0344480	-0.1556863
56	-0.0448750	-0.1550574
57	-0.0584943	-0.1547625
58	-0.0734996	-0.1548821
59	-0.0884990	-0.1549050
60	-0.0370161	-0.1520597
77	0.0355526	-0.1637000
61	-0.0382819	-0.1492660
62	-0.0401840	-0.1490817
63	-0.0514722	-0.1481891
64	-0.0659213	-0.1474774
65	-0.0810022	-0.1474085
66	-0.0884990	-0.1474086
67	-0.0068541	-0.1532978
68	-0.0183072	-0.1500628
69	-0.0319758	-0.1484470
70	-0.0402905	-0.1482002
71	-0.0457563	-0.1467135
72	-0.0578252	-0.1459031
73	-0.0831363	-0.1454886
74	-0.1074181	-0.1452151
75	-0.1314650	-0.1451903
76	-0.1435071	-0.1451906
78	0.0481852	-0.1525456
79	0.0288072	-0.1517318
80	0.0120740	-0.1502443
273	-0.0435228	-0.1416688
81	-0.0274513	-0.1357150
82	-0.0351383	-0.1348009
83	-0.0457835	-0.1336231
84	-0.0707858	-0.1332305
85	-0.0953543	-0.1330965
86	-0.1194258	-0.1331401
87	-0.1435071	-0.1331490
88	0.0427090	-0.1397723
89	0.0561898	-0.1269989
90	0.0324377	-0.1243416
91	-0.0223795	-0.1187370
92	-0.0376910	-0.1174523
93	-0.0711662	-0.1158554
94	-0.1193924	-0.1162687
95	0.0472246	-0.1099834
96	-0.0314350	-0.1003008
97	-0.0397659	-0.0999684

98	-C.C499663	-C.C995635
99	-0.0716588	-0.C994642
100	-C.C952104	-0.0993305
101	-0.1193566	-C.C993824
102	-0.1435003	-0.0993926
103	0.0617183	-0.0945047
104	0.0485571	-0.C930228
105	0.0340624	-0.0918703
106	0.0133721	-C.C912680
107	-0.0502434	-0.C924758
108	-0.0523913	-0.0877309
109	-C.C608447	-C.C880318
110	-0.0833365	-0.0876521
111	-C.1072517	-0.0873503
112	-0.1314296	-0.0873218
113	-0.1435003	-0.0873218
115	-C.0098973	-C.C849969
116	-0.0235556	-0.C858393
117	-C.C403609	-0.0862561
118	-C.0503847	-C.C862259
114	0.0621446	-0.0841810
119	-C.C525237	-C.C846803
120	-0.0608084	-0.C842086
121	-C.C818527	-0.0842533
122	-0.1037564	-0.C844069
123	-0.1258263	-0.0844275
277	-C.1368550	-0.0844282
124	C.C538208	-0.C794215
125	0.0336380	-0.0721706
126	-C.C504850	-C.C800574
276	0.0475014	-0.C681887
128	-0.0318062	-0.0725026
129	-C.C403645	-0.0728810
130	-0.0504148	-0.0732059
131	-C.C710685	-0.0733539
132	-C.C927538	-0.C724216
133	-0.1147968	-0.0734047
134	-C.1368554	-0.C734015
127	0.0433629	-0.C535096
135	0.0220765	-0.0531936
136	0.0429457	-0.C362032
138	0.0335614	-0.0323318
137	0.0450272	-0.0159471
140	-C.C226172	-0.C546056
141	-0.0392442	-0.0566629
142	-C.C707150	-0.0581169
143	-0.1148130	-0.C579753
145	0.0431574	-0.0088134
146	C.C175028	-C.C284421
147	-0.0292452	-C.C406942
148	-C.C378459	-0.0413971
149	-0.0478934	-C.C421680
150	-0.0704303	-0.0424826
151	-0.C927784	-0.0425589
152	-0.1148278	-0.C425369
153	-0.1368662	-0.0425345
154	-0.0466430	-C.C353873
155	-0.0487517	-0.0310923
156	-0.0588440	-0.0312899
157	-C.C816439	-C.0313576
158	-0.1038198	-0.0314940
159	-C.1258466	-0.0315123
160	-0.1368667	-0.0315128
162	0.0322281	-0.0105573
163	-C.C029032	-C.C251693
164	-0.0196087	-0.C283827

165	-C.C362868	-0.0299778
166	-0.0448985	-C.C300766
167	-0.0445247	-0.0292508
168	-C.C483804	-0.0293959
169	-0.0608391	-C.C296203
170	-0.0743643	-0.0298888
171	-C.C881491	-C.C299230
172	-0.0950228	-0.0299238
274	-0.0431407	-0.0264551
173	0.C369857	-C.CC32479
174	-0.0265708	-0.0209621
175	-C.C346199	-0.0217397
176	-0.0418303	-0.0226070
177	-0.0543012	-0.0229443
178	-C.C675123	-C.C230803
179	-0.0812703	-C.C230554
180	-C.C950235	-0.0230531
182	0.0206617	-C.CC18829
183	0.0145493	-0.0048938
184	-C.C0168106	-0.0100117
185	-0.0326693	-C.C119732
186	-0.0538870	-0.0137128
187	-0.0813001	-C.C134606
188	-0.0232403	-0.0025093
189	-0.0308593	-0.0030131
190	-C.C381862	-C.CC36018
191	-0.0534827	-0.0038089
192	-C.C675298	-0.0038318
193	-0.0813261	-0.CC38760
194	-0.0950521	-0.0038525
195	-C.C374200	0.0006135
196	-0.0388901	0.CC33076
197	-C.C456583	0.0034133
198	-C.C606209	C.CC31178
199	-0.2330846	-0.0002332
200	-C.C0882202	0.CC29986
201	-0.0950555	0.CC29952
202	0.0298275	0.0026280
203	0.0001853	C.CC40054
204	-0.0153773	0.CC037752
205	-0.0297771	0.CC037796
206	-C.C364829	C.CC037484
207	-0.0367291	0.0040814
208	-C.C405120	0.0036695
209	-0.0515364	0.0033492
210	-0.0629078	0.0031905
211	-C.C0743715	0.CC31602
212	-0.0800931	0.CC31585
213	-0.0355474	0.0061373
214	-0.0220818	0.CC94744
215	-0.0289365	0.CC93613
216	-0.0349151	0.0091135
217	-C.C459199	C.CC89885
218	-0.0571849	0.0088952
219	-C.C686438	0.0088821
220	-0.0800948	0.CC88739
221	0.0286689	0.0037547
222	0.CC273606	0.CC69593
223	0.0212141	0.CC98695
224	0.0125959	0.0123535
225	-0.0149736	C.CC164173
226	-0.0283508	0.0168447
227	-0.0458291	0.0166988
228	-C.C686538	0.CC168607
229	0.0271961	0.0090828
230	0.CC278078	C.CC57660

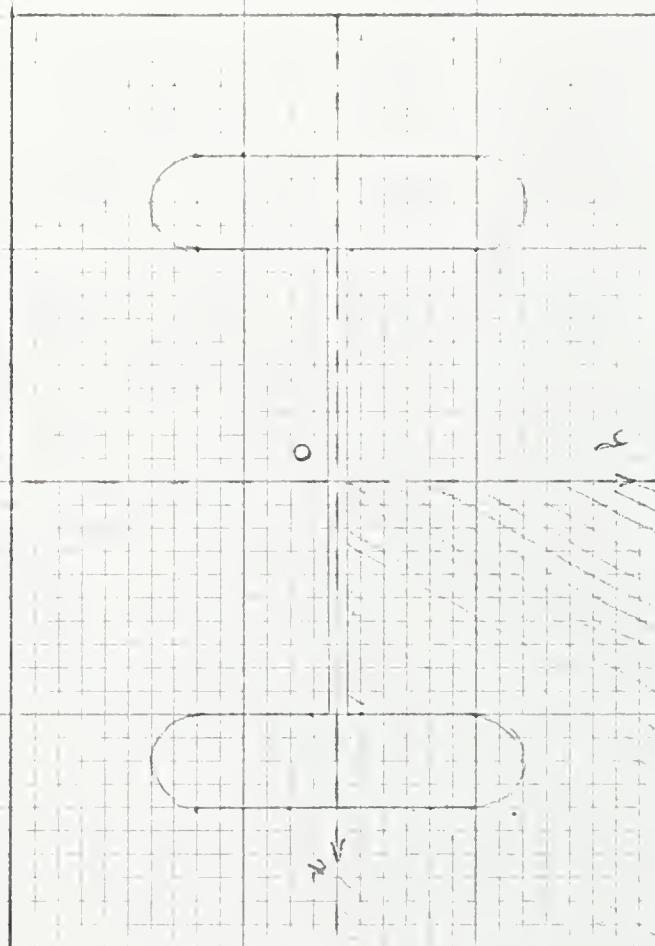
241	0.0279829	0.0062660
242	0.0272475	0.0130216
243	C.C244852	C.C135029
239	0.0274093	0.0036775
244	C.C202135	0.0157693
245	-0.0216518	0.C245128
246	-0.0340065	0.0246894
247	-C.C572542	C.C248246
248	-0.0801338	C.C248993
249	0.C280403	0.0024333
250	0.C273154	C.C231646
251	-0.0025049	0.0303386
252	-0.0153114	0.0312065
254	C.C271367	C.C007002
255	0.0202307	0.0310017
256	C.C105283	C.C314245
257	0.0276791	C.0000900
258	0.0273646	0.0382175
260	C.C269543	-C.C003007
261	0.0276207	-0.0003592
262	C.C273474	0.0453141
263	C.C201867	0.0452969
264	0.0035888	0.0453250
265	-C.C0155391	C.C457730
266	-0.0217905	0.0457815
267	-0.0457032	0.0456517
268	-C.0687152	C.C455426
269	-0.0801603	0.0455425

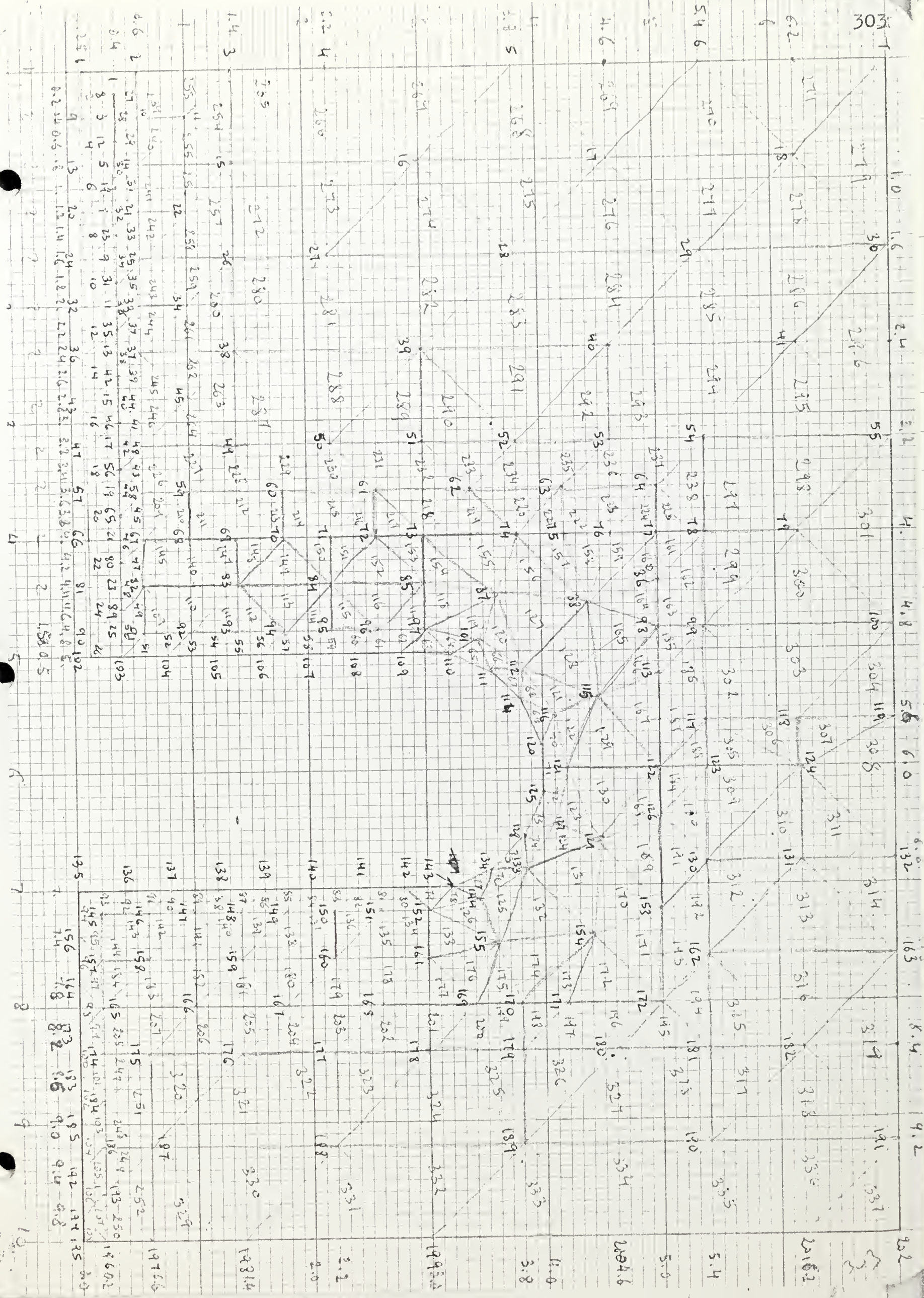
APPENDIX 8

H-slit aluminum , 'CSTG' type .

The following presents :

- 1- Plate division , numbers are element names and node names ,
pages 302, 303 .
- 2- Input data , pp 304 - 321 .
- 3- Output data , pp 322 - 325 .





APPENDIX 8 TH-SLIT AL
 TWO PLANE STRESS
 UNITS INCHES
 UNITS ROUNDED
 JOINT COORDINATES

1	0.0	0.125	0
2	0.0	0.6	0
3	0.0	1.4	0
4	0.0	2.2	0
5	0.0	3.0	0
6	0.0	5.4	0
7	0.0	7.0	0
8	0.2	0.4	
9	0.4	0.125	
10	0.4	0.6	
11	0.4	1.0	
12	0.6	0.4	
13	0.8	0.125	
14	0.8	0.6	
15	0.8	1.4	
16	0.8	2.0	
17	0.8	4.6	
18	0.8	6.2	
19	1.0	0.4	
20	1.2	0.125	
21	1.2	0.6	

22 1.2 1.0

23 1.4 0.4

24 1.6 0.125

25 1.6 0.6

26 1.6 1.4

27 1.6 2.2

28 1.6 3.8

29 1.6 5.4

30 1.6 7.0

31 1.8 0.4

32 2.0 0.125

33 2.0 0.6

34 2.0 1.0

35 2.2 0.4

36 2.4 0.125

37 2.4 0.6

38 2.4 1.4

39 2.4 3.0

40 2.4 4.6

41 2.4 6.2

42 2.6 0.4

43 2.8 0.125

44 2.8 0.6

45 2.8 1.0

46 3.0 0.4

47 3.2 0.125

48 3.2 0.6

49 3.2 1.4

50 3.2 2.2

51 3.2 3.0

52 3.2 3.8

53 3.2 4.6

54 3.2 5.4

305

55 3.2 7.0

56 3.4 0.4

57 3.6 0.125

58 3.6 0.6

59 3.6 1.0

60 3.6 1.8

61 3.6 2.6

62 3.6 3.4

63 3.6 4.2

64 3.6 5.0

65 3.8 0.4

66 4.0 0.125

67 4.0 0.6

68 4.0 1.0

69 4.0 1.4

70 4.0 1.8

71 4.0 2.2

72 4.0 2.6

73 4.0 3.0

74 4.0 3.8

75 4.0 4.2

76 4.0 4.6

77 4.0 5.0

78 4.0 5.4

79 4.0 6.2

80 4.2 0.4

81 4.4 0.125

82 4.4 0.6

83 4.4 1.4

84 4.4 2.2

85 4.4 3.0

86 4.4 5.0

87 4.5 3.6

89 4.6 0.4
88 4.6 4.4
90 4.8 0.125
91 4.8 0.6
92 4.8 1.0
93 4.8 1.4
94 4.8 1.8
95 4.8 2.2
96 4.8 2.6
97 4.8 3.0
98 4.8 5.0
99 4.8 5.4
100 4.8 7.0
101 4.889 3.460
102 5.0 0.125
103 5.0 0.4
104 5.0 0.8
105 5.0 1.2
106 5.0 1.6
107 5.0 2.0
108 5.0 2.4
109 5.0 2.8
110 5.019 3.193
112 5.152 3.848
111 5.169 3.556
113 5.2 5.0
115 5.4 4.5
114 5.446 3.831
116 5.540 4.111
117 5.6 5.4
118 5.6 6.2
119 5.6 7.0
120 5.807 3.981

121 6.0 4.2

122 6.0 5.0

123 6.0 5.4

124 6.0 6.2

125 6.193 3.981

126 6.4 5.0

127 6.460 4.111

128 6.556 3.831

129 6.6 4.5

130 6.8 5.4

131 6.8 6.2

132 6.8 7.0

134 6.831 3.556

133 6.848 3.848

143 6.981 3.193

135 7.0 0.0 S

136 7.0 0.4

137 7.0 0.8

138 7.0 1.2

139 7.0 1.6

140 7.0 2.0

141 7.0 2.4

142 7.0 2.8

144 7.111 3.460

145 7.2 0.2

146 7.2 0.6

147 7.2 1.0

148 7.2 1.4

149 7.2 1.8

150 7.2 2.2

151 7.2 2.6

152 7.2 3.0

153 7.2 5.0

156 7.4 0.0 S

154 7.4 4.4

155 7.5 3.6

157 7.6 0.2

158 7.6 0.6

159 7.6 1.4

160 7.6 2.2

161 7.6 3.0

162 7.6 5.4

163 7.6 7.0

164 7.8 0.0 S

165 8.0 0.2

166 8.0 1.0

167 8.0 1.8

168 8.0 2.6

169 8.0 3.4

170 8.0 3.8

171 8.0 4.2

172 8.0 5.0

173 8.2 0.0 S

174 8.4 0.2

175 8.4 0.6

176 8.4 1.4

177 8.4 2.2

178 8.4 3.0

179 8.4 3.8

180 8.4 4.6

181 8.4 5.4

182 8.4 6.2

183 8.6 0.0 S

184 8.8 0.2

185 9.0 0.0 S

186 9.2 0.2

187 9.2 0.6

310

188 9.2 2.2

189 9.2 3.8

190 9.2 5.4

191 9.2 7.0

192 9.4 0.0 S

193 9.6 0.2

194 9.8 0.0 S

195 10.0 0.0 S

196 10.0 0.2

197 10.0 0.6

198 10.0 1.4

199 10.0 3.0

200 10.0 4.6

201 10.0 6.2

202 10.0 7.0

ELEMENT INCIDENCES

1 1 8 2

2 1 9 8

3 8 9 12

4 9 13 12

5 12 13 19

6 13 20 19

7 19 20 23

8 23 20 24

9 23 24 31

10 24 32 31

11 31 32 35

12 32 36 35

13 35 36 42

14 36 43 42

15 42 43 46

16 43 47 46

17	46	47	56
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18	47	57	56
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19	56	57	65
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20	57	66	65
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21	65	66	80
----	----	----	----

22	66	81	80
----	----	----	----

23	80	81	89
----	----	----	----

24	81	90	89
----	----	----	----

25	89	90	103
----	----	----	-----

26	90	102	103
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27	2	8	10
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28	8	12	10
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29	10	12	14
----	----	----	----

30	12	19	14
----	----	----	----

31	14	19	21
----	----	----	----

32	19	23	21
----	----	----	----

33	21	23	25
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34	25	23	31
----	----	----	----

35	25	31	33
----	----	----	----

36	31	35	33
----	----	----	----

37	33	35	37
----	----	----	----

38	37	35	42
----	----	----	----

39	37	42	44
----	----	----	----

40	44	42	46
----	----	----	----

41	44	46	48
----	----	----	----

42	48	46	56
----	----	----	----

43	48	56	58
----	----	----	----

44	58	56	65
----	----	----	----

45	58	65	67
----	----	----	----

46	67	65	80
----	----	----	----

47	67	80	82
----	----	----	----

48	82	80	89
----	----	----	----

49	82	89	91
----	----	----	----

50 91 89 103

51 91 103 104

52 92 91 104

53 92 104 105

54 93 92 105

55 93 105 106

56 94 93 106

57 94 106 107

58 95 94 107

59 95 107 108

60 96 95 108

61 96 108 109

62 97 96 109

63 97 109 110

64 101 97 110

65 101 110 111

66 101 111 112

67 112 111 114

68 112 114 116

69 114 120 116

70 116 120 121

71 121 120 125

72 121 125 127

73 125 128 127

74 127 128 133

75 128 134 133

76 133 134 144

77 134 143 144

78 144 143 152

79 143 142 152

80 142 151 152

81 142 141 151

82 141 150 151

83 141 140 150

84 140 149 150

85 140 139 149

86 139 148 149

87 139 138 148

88 138 147 148

89 138 137 147

90 137 146 147

91 137 136 146

92 136 145 146

93 136 135 145

94 135 156 145

95 145 156 157

96 157 156 164

97 157 164 165

98 165 164 173

99 165 173 174

100 174 173 183

101 174 183 184

102 183 185 184

103 184 185 186

104 186 185 192

105 186 192 193

106 193 192 194

107 193 194 196

108 194 195 196

109 82 91 92

110 83 82 92

111 83 92 93

112 83 93 94

113 84 83 94

114 84 94 95

115 84 95 96

116 85 84 96

117 85 96 97

118 87 85 97

119 87 97 101

120 87 101 112

121 112 116 115

122 115 116 121

123 121 127 129

124 129 127 133

125 133 144 155

126 155 144 152

127 88 87 112

128 88 112 115

129 115 121 122

130 122 121 129

131 129 133 154

132 133 155 154

133 152 161 155

134 152 151 161

135 151 160 161

136 151 150 160

137 150 149 160

138 149 159 160

139 149 148 159

140 148 147 159

141 147 158 159

142 147 146 158

143 146 145 158

144 145 157 158

145 68 67 82

146 68 82 83

147 69 68 83

148 70 69 83

149 70 83 84

150 71 70 84

151 72 71 84

152 72 84 85

153 73 72 85

154 73 85 87

155 74 73 87

156 74 87 88

157 75 74 88

158 76 75 88

159 77 76 88

160 86 77 88

161 78 77 86

162 78 86 99

163 86 98 99

164 86 88 98

165 98 88 115

166 98 115 113

167 113 115 122

168 122 129 126

169 126 129 153

170 129 154 153

171 153 154 172

172 154 171 172

173 154 170 171

174 154 155 170

175 155 169 170

176 155 161 169

177 161 168 169

178 161 160 168

179 160 167 168

180 160 159 167

181 159 166 167

182 159 158 166

183 158 165 166

184 158 157 165

185 99 98 113

186 99 113 117

187 113 122 117

188 117 122 123

189 123 122 126

190 123 126 130

191 126 153 130

192 130 153 162

193 153 172 162

194 162 172 181

195 172 180 181

196 172 171 180

197 171 179 180

198 171 170 179

199 170 169 179

200 169 178 179

201 169 168 178

202 168 177 178

203 168 167 177

204 167 176 177

205 167 166 176

206 166 175 176

207 166 165 175

208 165 174 175

209 59 58 67

210 59 67 68

211 59 68 69

212 60 59 69

213 60 69 70

214 60 70 71

215 61 60 71

317

216 61 71 72

217 61 72 73

218 62 61 73

219 62 73 74

220 63 62 74

221 63 74 75

222 63 75 76

223 64 63 76

224 64 76 77

225 64 77 78

226 48 58 59

227 49 48 59

228 49 59 60

229 50 49 60

230 50 60 61

231 51 50 61

232 51 61 62

233 52 51 62

234 52 62 63

235 53 52 63

236 53 63 64

237 54 53 64

238 54 64 78

239 2 10 11

240 11 10 14

241 14 21 22

242 22 21 25

243 25 33 34

244 34 33 37

245 37 44 45

246 45 44 48

247 175 174 184

248 184 186 187

318

249 187 186 193

250 193 196 197

251 175 184 187

252 187 193 197

253 3 2 11

254 3 11 15

255 11 14 15

256 15 14 22

257 15 22 26

258 22 25 26

259 26 25 34

260 26 34 38

261 34 37 38

262 38 37 45

263 38 45 49

264 45 48 49

265 4 3 15

266 4 15 16

267 5 4 16

268 5 16 17

269 6 5 17

270 6 17 18

271 7 6 18

272 15 26 27

273 16 15 27

274 16 27 28

275 17 16 28

276 17 28 29

277 18 17 29

278 18 29 30

279 7 18 30

280 27 26 38

281 27 38 39

282 28 27 39

283 28 39 40

284 29 28 40

285 29 40 41

286 30 29 41

287 38 49 50

288 39 38 50

289 39 50 51

290 39 51 52

291 40 39 52

292 40 52 53

293 40 53 54

294 41 40 54

295 41 54 55

296 30 41 55

297 54 78 79

298 55 54 79

299 79 78 99

300 79 99 100

301 55 79 100

302 99 117 118

303 100 99 118

304 100 118 119

305 117 123 124

306 118 117 124

307 119 118 124

308 119 124 132

309 124 123 130

310 124 130 131

311 124 131 132

312 131 130 162

313 131 162 163

314 132 131 163

320

315 162 181 182

316 163 162 182

317 182 181 190

318 182 190 191

319 163 182 191

320 176 175 187

321 176 187 188

322 177 176 188

323 178 177 188

324 178 188 189

325 179 178 189

326 180 179 189

327 180 189 190

328 181 180 190

329 187 197 198

330 188 187 198

331 188 198 199

332 189 188 199

333 189 199 200

334 190 189 200

335 190 200 201

336 191 190 201

337 191 201 202

ELEMENT PROPERTIES

1 TO 337 TYPE 'CSTG' THICKNESS 0.50

CONSTANTS

E 10000.0 ALL

POISSON 0.30 ALL

JOINT RELEASES

1 TO 7 FORCE Y

135 156 164 173 183 185 192 194 195 FORCE X

\$ PLATE LENGTH=20.0, WIDTH=14.0

\$ WELD WIDTH= 0.25

321

\$ WELD LENGTH= 10.0

\$H-BRANCH WIDTH=2.0,END CIRCLES ON H-BRANCH RADIUS=1.0,

\$ H-BRANCH OVERALL HEIGHT=8.0

\$ FORCE APPLIED 5*10**3 LBS/IN , SIGMAC=10**4 PSI

LOADING 'ONE' 'UNIFORM'

JOINT LOADS

1 FORCE Y -1.0

90 FORCE Y -1.5

102 FORCE Y -0.5

9 13 20 24 32 36 43 47 57 66 81 FORCE Y -2.0

STIFFNESS ANALYSIS

LIST DISPLACEMENTS STRESSES ALL

LOADING - CNE

UNIFORM

RESULTANT JOINT DISPLACEMENTS - SUPPORTS

JOINT	/-----DISPLACEMENT-----/		
	X DISP.	Y DISP.	Z DISP.
1	0.0	-0.0734304	
2	0.0	-0.0732901	
3	0.0	-0.0730776	
4	0.0	-0.0729944	
5	0.0	-0.0730816	
6	0.0	-0.0730194	
7	0.0	-0.0720410	
135	0.0330964	0.0	
156	0.0337439	0.0	
164	0.0342816	0.0	
173	0.0347161	0.0	
183	0.0350607	0.0	
185	0.0352212	0.0	
192	0.0352238	0.0	
194	0.0350612	0.0	
195	0.0348052	0.0	

RESULTANT JOINT DISPLACEMENTS - FREE JOINTS

JOINT	/-----DISPLACEMENT-----/		
	X DISP.	Y DISP.	Z DISP.
8	0.0003838	-0.0733216	
9	0.0008696	-0.0733365	
10	0.0006991	-0.0731801	
11	0.0006163	-0.0730569	
12	0.0011350	-0.0731428	
13	0.0017161	-0.0730734	
14	0.0013750	-0.0729197	
15	0.0010726	-0.0726833	
16	0.0006284	-0.0725782	
17	-0.0003482	-0.0727473	
18	-0.0019166	-0.0722604	
19	0.0018617	-0.0727860	
20	0.0025135	-0.0726452	
21	0.0020233	-0.0724604	
22	0.0017853	-0.0723159	
23	0.0025314	-0.0722640	
24	0.0032360	-0.0720620	
25	0.0026106	-0.0718601	
26	0.0020396	-0.0715668	
27	0.0017743	-0.0713860	
28	0.0005670	-0.0714752	
29	-0.0021129	-0.0715338	
30	-0.0056385	-0.0705310	
31	0.0031328	-0.0715945	
32	0.0038582	-0.0713521	

33	0.0031329	-0.0711063
34	0.0028003	-0.0709076
35	0.0036385	-0.0708076
36	0.0043586	-0.0705442
37	0.0035580	-0.0702620
38	0.0029029	-0.0698338
39	0.0021158	-0.0694035
40	-0.0006033	-0.0695823
41	-0.0058528	-0.0691124
42	0.0040402	-0.0699404
43	0.0047221	-0.0696831
44	0.0038979	-0.0693519
45	0.0035501	-0.0690725
46	0.0043242	-0.0690407
47	0.0049454	-0.0688052
48	0.0041136	-0.0684317
49	0.0034790	-0.0677650
50	0.0032827	-0.0671759
51	0.0028714	-0.0668065
52	0.0016165	-0.0667331
53	-0.0005993	-0.0665969
54	-0.0039515	-0.0665549
55	-0.0119862	-0.0653671
56	0.0044948	-0.0681432
57	0.0050247	-0.0679629
58	0.0042538	-0.0675405
59	0.0038847	-0.0671682
60	0.0035397	-0.0663667
61	0.0035236	-0.0655600
62	0.0029068	-0.0650968
63	0.0010473	-0.0649150
64	-0.0023052	-0.0645870
65	0.0045575	-0.0673177
66	0.0049813	-0.0672186
67	0.0042944	-0.0667530
68	0.0039410	-0.0663348
69	0.0037252	-0.0658606
70	0.0036496	-0.0653360
71	0.0036651	-0.0647818
72	0.0037809	-0.0642043
73	0.0037941	-0.0636907
74	0.0027790	-0.0631182
75	0.0013413	-0.0627652
76	-0.0003738	-0.0625428
77	-0.0025117	-0.0622293
78	-0.0048646	-0.0619359
79	-0.0100906	-0.0614059
80	0.0045244	-0.0666168
81	0.0048639	-0.0665914
82	0.0042308	-0.0661061
83	0.0036249	-0.0651482
84	0.0036578	-0.0638036
85	0.0041040	-0.0621180
86	-0.0026128	-0.0594468
87	0.0041632	-0.0605264
88	0.0044326	-0.0660375
88	0.0011789	-0.0588728
90	0.0047234	-0.0660648
91	0.0041477	-0.0655852
92	0.0037909	-0.0651484
93	0.0035161	-0.0646391
94	0.0034570	-0.0640057
95	0.0034727	-0.0631787
96	0.0038370	-0.0620569
97	0.0043033	-0.0606865
98	-0.0027762	-0.0562197

99	-0.0056394	-0.0558311
100	-0.0189485	-0.0542302
101	0.0046222	-0.0584420
102	0.0046625	-0.0658193
103	0.0043145	-0.0655489
104	0.0038963	-0.0651744
105	0.0035645	-0.0647421
106	0.0033807	-0.0642461
107	0.0033242	-0.0635583
108	0.0034650	-0.0626866
109	0.0038693	-0.0613408
110	0.0043303	-0.0591816
112	0.0048875	-0.0550030
111	0.0050418	-0.0559023
113	-0.0028326	-0.0521471
115	0.0011778	-0.0507710
114	0.0060730	-0.0509330
116	0.0045610	-0.0491666
117	-0.0065178	-0.0467495
118	-0.0139220	-0.0462446
119	-0.0220553	-0.0454178
120	0.0072025	-0.0448302
121	0.0051331	-0.0417383
122	-0.0030292	-0.0416148
123	-0.0066800	-0.0412960
124	-0.0145966	-0.0411618
125	0.0091869	-0.0380371
126	-0.0027502	-0.0352666
127	0.0075689	-0.0332357
128	0.0119179	-0.0310369
129	0.0027760	-0.0315591
130	-0.0066030	-0.0297177
131	-0.0152785	-0.0300276
132	-0.0248739	-0.0300503
134	0.0151415	-0.0249421
133	0.0115719	-0.0255821
143	0.0186964	-0.0203147
136	0.0327808	-0.0025066
137	0.0320017	-0.0049034
138	0.0308047	-0.0073076
139	0.0291854	-0.0096803
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141	0.0246902	-0.0144947
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146	0.0327708	-0.0033322
147	0.0318128	-0.0055110
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151	0.0237362	-0.0143071
152	0.0207542	-0.0165378
153	-0.0019208	-0.0234477
154	0.0054706	-0.0192248
155	0.0151509	-0.0156351
157	0.0339205	-0.0008688
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159	0.0310711	-0.0060579
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162	-0.0059966	-0.0186259
163	-0.0251634	-0.0191380
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167	0.0295894	-0.0056314

168	0.0244524	-0.0078570
169	0.0174352	-0.0027382
170	0.0131787	-0.0105464
171	0.0084955	-0.0114080
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180	0.0041968	-0.0075160
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182	-0.0153042	-0.0087957
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186	0.0351503	0.0000761
187	0.0348302	0.0002307
188	0.0277874	0.0008040
189	0.0137354	0.0012130
190	-0.0051574	0.0011473
191	-0.0251415	0.0011087
193	0.0351286	0.0003403
196	0.0347258	0.0007609
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200	0.0045618	0.0101940
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202	-0.0251017	0.0109661

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